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## **H-60A/L PASSENGER AIRBAG PROTECTION: VERTICAL AND HORIZONTAL IMPACT TESTS**

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## **PREFACE**

The work described herein was performed for Concurrent Technologies Corp under contract to the Defense Safety Oversight Council (DSOC). The work was completed by Infoscitex and the Aerospace Biodynamics and Performance Team of the Applied Neuroscience Branch of the Human Effectiveness Directorate (711HPW/RHCP), under a Cooperative Research & Development Agreement (CRADA) between Infoscitex Corp (IST) and the 711 HPW/RHCP – CRADA # 09-336-RH-01CRD. All work was completed using the impact facilities located at Wright-Patterson Air Force Base, Ohio.

## TABLE OF CONTENTS

Section	Page
1.0 SUMMARY .....	1
2.0 BACKGROUND .....	1
3.0 OBJECTIVES .....	2
4.0 METHODS .....	3
4.1 Facilities .....	3
4.2 Coordinate System .....	4
4.3 Manikins .....	5
4.4 Seats .....	5
4.5 Seat modifications .....	6
4.6 Restraints .....	9
4.7 Seat Orientations .....	10
4.8 Data Acquisition .....	12
4.9 Video and Photography .....	15
4.10 Evaluation Criteria .....	16
4.11 Injury Criteria .....	16
5.0 RESULTS .....	19
5.1 Test Overview .....	19
5.2 Test-by-Test Description .....	22
6.0 DISCUSSION .....	33
6.1 Pure Horizontal Test Discussion .....	33
6.2 Pure Vertical Test Discussion .....	34
6.3 Combined Vertical Test Discussion .....	36
6.4 General Observations .....	36
7.0 CONCLUSIONS .....	37
8.0 REFERENCES .....	37
9.0 ACRONYM .....	39
10.0 APPENDIX A. INJURY CRITERIA RESULTS .....	40
11.0 APPENDIX B – HIA DATA .....	41
12.0 APPENDIX C – VDT DATA .....	88

## LIST OF FIGURES

<b>Figure</b>	<b>Page</b>
Figure 1. AFRL HIA Shown with Rigid Seat Configuration .....	3
Figure 2. AFRL VDT Shown with H-60A/L Seat in Pure Vertical Configuration .....	4
Figure 3. Seat and Manikin Sensor Coordinate System .....	4
Figure 4. H-60A/L Seat.....	6
Figure 5. Additional Seat Pan Fabric Layer (L) Top of Seat Pan (R) Bottom of Seat Pan .....	7
Figure 6. Wrapped upper attachments .....	7
Figure 7. Restraint modifications (L) Single Strap (R) Double Strap .....	8
Figure 8. Seat Pan Accelerometer Pack .....	8
Figure 9. Seat Fixture Load Cell.....	9
Figure 10. Neck Displacement Transducer.....	9
Figure 11. Airbag Restraint (L) Uninflated (R) Inflated.....	10
Figure 12. (L) Pure and (R) Combined Vertical Configurations Completed on the VDT .....	10
Figure 13. Pure Horizontal Configuration Completed on the HIA.....	11
Figure 14. Restraint Belt Load Cell .....	12
Figure 15. TDAS PRO Data Acquisition System on Top of VDT Carriage .....	14
Figure 16. TDAS Pro Data Acquisition System at the Back of HIA Sled .....	14
Figure 17. Phantom Miro 3 Camera .....	16
Figure 18. Eiband Injury Levels .....	19
Figure 19. HIA8621 (L) Manikin submarine and seat pan dipping (R) Post test manikin position .....	22
Figure 20. HIA8622 (L) Manikin submarining and seat pan dipping (R) Post test manikin position .....	23
Figure 21. HIA8623 (L) Manikin submarining (R) Post Test Manikin Position.....	24
Figure 22. HIA8704 Test (L) Manikin submarine (R) Post test (B) Buckle .....	25
Figure 23. HIA8705 (L) Manikin flail (R) Rebound (B) Post test .....	26
Figure 24. HIA8706 (L) Manikin flail (R) Rebound (B) Post test .....	27
Figure 25. HIA8710 (L) Manikin flail (R) Post test (B) Broken seat pan .....	28
Figure 26. VDT6279 (L) Test (R) Seat pan failure .....	29
Figure 27. VDT6280 (L) Test (R) Seat pan failure .....	29
Figure 28. VDT6283 (L) Front left attachment (R) Back right foot disengaged.....	30
Figure 29. VDT6285 (L) Test (R) Post test (B) Airbag restraint.....	31
Figure 30. VDT6286 Test.....	32
Figure 31. Eiband PV 35g.....	35

## LIST OF TABLES

<b>Table</b>	<b>Page</b>
Table 1. Manikin Weight Distribution (lbs) .....	5
Table 2. Test Matrix.....	11
Table 3. Data Channels Recorded.....	13
Table 4. Critical Intercept Values for Nij Calculation at C0-C1 for a Given Occupant Size .....	17
Table 5. Abbreviated Injury Scale Scores and Associated Injury .....	17
Table 6. Seat Stroke Distance (in) .....	32
Table 7. Rigid Seat PH Comparison HB50 .....	33
Table 8. H-60A/L Seat PH Comparison HB50.....	34
Table 9. H-60A/L Seat PV Comparison 35g HB50.....	35
Table 10. H-60A/L Seat CV Comparison LARD.....	36

## **1.0 SUMMARY**

A series of dynamic impact tests were conducted using operational helicopter troop seats, a rigid seat, and two different sized manikins in order to determine the efficacy of prototype helicopter passenger airbag restraints. The seats included forward facing H-60A/L seats, and a custom-made rigid seat. The manikins included a 50th percentile Hybrid III (HB50) and a large male manikin (LARD – Largest Anthropometric Research Dummy). The restraints included the standard H-60A/L restraint and an airbag restraint configuration developed and fabricated specifically for this program by AmSafe. The equipment was tested at three impact orientations, including Combined Vertical, Pure Vertical and Pure Horizontal, and at different acceleration and energy levels ranging from 16-35G. Acceleration, force, and moment data collected on the manikins were compared to standard injury criteria established by the Full Spectrum Crashworthiness Report (Bolukbasi et al, 2011). During initial testing, structural failures of the seat and severe submarining of the manikin were observed which prevented comparison of the airbag restraint and standard restraint. Modifications to the H-60A/L seat hangers, seatpan fabric, and restraint were necessary to allow for the restraints to be compared at the acceleration and energy levels of this program. With the structural improvements, the airbag restraints demonstrated a higher level of protection than the standard restraint when comparing manikin response to the injury criteria used for the study.

The work described herein was performed for Concurrent Technologies Corp under contract to the Defense Safety Oversight Council (DSOC). The work was completed by Infoscitex and the Aerospace Biodynamics and Performance Team of the Applied Neuroscience Branch of the Human Effectiveness Directorate (711HPW/RHCP), under a Cooperative Research & Development Agreement (CRADA) between Infoscitex Corp. and the 711 HPW/RHCP – CRADA # 09-336-RH-01CRD. All work was completed using the impact facilities located at Wright-Patterson Air Force Base, Ohio.

## **2.0 BACKGROUND**

A recent study of 917 Class A and B Department of Defense (DoD) helicopter mishaps indicated that occupants of helicopter cargo compartments have a significantly greater chance of injury or death during a mishap than occupants in the cockpit (Mapes et al, 2007). The study discovered that vascular injuries to the chest were the leading cause of fatality in Class A helicopter mishaps, and that open skull fractures were the second. These two mechanisms of fatality were the most common compared to other causes such as injuries to the neck and extremities. The study also indicated that Navy SH-60B/F/H aircraft had a lower rate of cargo compartment injury and death, particularly from 1995 through 2005 when compared against other DoD helicopters from 1985 through 1994. This may have been due in part to the fact that the Navy SH-60 aircraft were originally outfitted with stroking, crashworthy seating. A finding from the Rotorcraft Survivability Study (2009) discovered that of 496 rotorcraft fatalities from October 2001 through September 2009, over 90% of those fatalities occurred during the crash event.

The H-60 passenger protection system has been the gold standard of the DoD fleet. With a large number of helicopters in service and a robust mishap history, more is known about this system's injury history than most others. Improvements in survivability seen in the H-60 could be generalized to all helicopter forward/aft facing seating. While impact testing has been widely performed on ejection seats, only limited testing has been done on helicopter seating.

Considering these findings the Defense Safety Oversight Council (DSOC) initiated and funded this program. Infoscitex (IST) was subcontracted by Concurrent Technologies Corporation (CTC) to perform the program.

This test program consisted of impact testing of standard and prototype airbag restraint configurations in conjunction with H-60A/L seats, a custom-made rigid seat, and two different sized manikins at acceleration and energy levels ranging from 16-35G.

Tests were conducted to compare how effectively the airbag restraints protect occupants within the H-60A/L troop seat. Passenger airbags in cars have been very successful, and cockpit airbags in OH-58D helicopters have saved a number of lives. Airbag restraints within the H-60 are hypothesized to have a substantially positive effect, but the quantitative value had not previously been tested and measured in this rotorcraft setting. There is potential for airbags to reduce occupant motion, lessen crash forces, and show value in injury prevention.

The comparative testing is experimental and not intended to qualify specific seats or restraints for acquisition. Consideration of the weight and cost of seats were beyond the scope of this research effort. Test conditions were chosen to show crashworthiness protection at different levels and orientations. The methodology that was developed for this effort allows seating to be tested independent of airframes and could be used for the basis of performance testing prior to finalizing acquisition decisions. Comparative testing that is not dependent upon specific airframes allows direct comparison of the crashworthy properties of various seats developed at different times and with different technologies. Seating between different aircraft can be directly compared. The most effective seat structure, energy attenuator technologies, and restraint configurations can be identified and shared among rotorcraft and fixed-wing platforms using the defined test methodology.

This testing focuses solely on the survivability of the seat, restraint configurations, and occupant biodynamics during primary impact. Secondary injury effects, such as an occupant impacting other occupants, equipment, or aircraft structure are not considered in this study. Also, the ability of the occupant to egress the rotorcraft post-crash was not considered.

### **3.0 OBJECTIVES**

The primary objective of this experimental study was to investigate the effectiveness of using newly developed airbag restraints to reduce occupant injury risk with current H-60 Black Hawk and Pave Hawk rotorcraft seating.

This objective was met by quantitatively comparing instrumented manikins' responses while restrained with either the airbag restraint or the standard H-60A/L restraint, and using both the legacy H-60A/L seats and a custom built rigid seat.

## 4.0 METHODS

### 4.1 Facilities

The Horizontal Impulse Accelerator (HIA) was used for all Pure Horizontal (PH) testing. The HIA consists of a 4 ft by 8 ft sled positioned on a 204 ft long track and is accelerated using a 24 inch diameter pneumatic actuator. The HIA operates on the principle of differential gas pressures acting on both surfaces of a thrust piston in a closed cylinder. The impact acceleration occurs at the beginning of the experiment as stored high-pressure air is allowed to impinge the surface of the thrust piston, thus propelling the sled. As the sled breaks contact with the thrust piston, the sled coasts to a stop or is stopped with a triggered pneumatic brake system. The impact acceleration is roughly sinusoidal. Metering pin #52 was used for all cells.



**Figure 1. AFRL HIA Shown with Rigid Seat Configuration**

The 711HPW/RHCP Vertical Deceleration Tower (VDT) was used for all Combined Vertical (CV) and Pure Vertical (PV) tests. The VDT is a 40 ft gravity-assisted tower primarily used for simulation of the catapult phase of ejection. The VDT facility is composed of two vertical rails and a drop carriage. The carriage is allowed to enter a free-fall state (guided by the rails) from a pre-determined drop height. A plunger mounted on the rear of the carriage is guided into a cylinder filled with water located at the base and between the vertical rails. A deceleration pulse is produced when water is displaced from the cylinder by the carriage-mounted plunger. The pulse shape is also roughly sinusoidal and is controlled by varying the drop height and shape of the plunger. Plunger #104 was used for all cells.

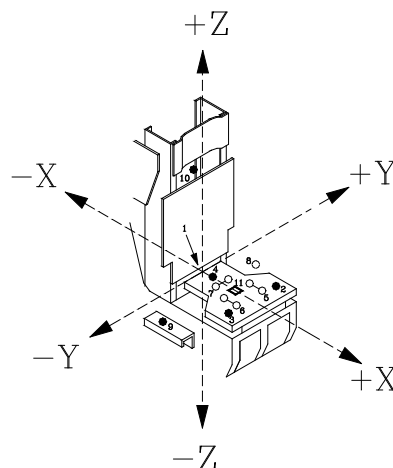


**Figure 2. AFRL VDT Shown with H-60A/L Seat in Pure Vertical Configuration**

During qualification testing, the mounting locations of the seats are often deformed to simulate deformation of an airframe during impact. For these comparison tests, it was determined that deformation of mounting points was not necessary.

## **4.2 Coordinate System**

Figure 3 shows the coordinate system used to set-up seat and manikin orientations as well as sensor data channels. The “right-handed” rule coordinate system is used.



**Figure 3. Seat and Manikin Sensor Coordinate System**



### 4.3 Manikins

Tests were conducted with two different sized manikins, including a 50<sup>th</sup> percentile Hybrid III Aerospace manikin (HB50) representing a mid-sized male and a Large Anthropomorphic Research Device (LARD) manikin representing a large male. Both HB50 and LARD manikins are Hybrid III-type manikins with the LARD scaled to represent large occupants in the aerospace environment. LARD is also used by the Air Force and JSF in ejection seat testing. Both manikins were dressed in a flight suit and a medium Advanced Combat Helmet (ACH) helmet. Weight distributions of the manikins are given in Table 1.

**Table 1. Manikin Weight Distribution (lbs)**

	<b>HB50</b>	<b>LARD</b>
<b>Upper torso</b>	77.0	112.3
<b>Lower Torso</b>	83.0	119.8
<b>Helmet, flight suit</b>	4.7	9.6
<b>Total</b>	164.7	241.7

### 4.4 Seats

Two different types of seats were used in this program; a custom built rigid seat and the legacy H-60A/L forward facing troop seat. The rigid seat was made by AmSafe and based on measurements of the H-60A/L seat. The H-60A/L forward facing seat is the standard troop seat currently installed in Army, Navy, and Coast Guard H-60 rotorcraft. The seat consists of an aluminum tubing structure with a fabric covering for the seat pan and seat back (Figure 4). There are two attachment points at the top of the seat spaced 16 inches apart and four attachment points at the bottom of the seat. The seat uses wire benders to provide energy attenuation during a crash event. The seat does not have side supports and includes a backpack “pouch” that is accessible through a Velcro seat back. For this program the backpack pouch was kept closed. Seats were obtained through the Defense Reutilization and Marketing Offices (DRMO), both AF and Navy maintenance depots, Sikorsky, and private sellers. Any previously-used seats were inspected and rebuilt as needed using AF TO 1H-60(H) G-2-2 and were restored to what would be acceptable for flight use. Ten seats were purchased new through Sikorsky.



**Figure 4. H-60A/L Seat**

#### **4.5 Seat modifications**

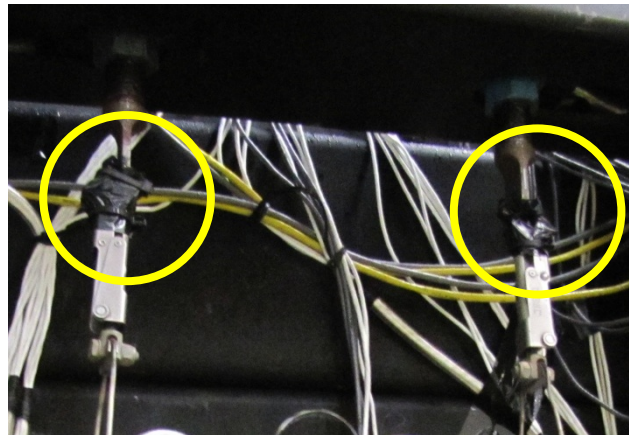
As the program progressed, several modifications to the seat were necessary to ensure structural integrity during the test. Without these modifications it would have been impossible to complete the objectives of this program.

1. An additional layer of fabric was added to the seat pan to prevent the manikin tearing through the seat pan. It was noted on previous VDT tests (vertical and combined vertical), the manikin's buttocks would rip the seat pan fabric from the frame, allowing the manikin to fall through the seat pan framing. The additional layer of fabric is a marine fabric that was removed from a prototype seat that had been previously evaluated in a comparative seat impact program. This additional layer was fit over the complete H-60A/L seat and secured under the seat pan. A thin seat cushion was wedged between the bottom of the standard seat pan and attachment strap to prevent any hard points on the seat pan fabric.



**Figure 5. Additional Seat Pan Fabric Layer (L) Top of Seat Pan (R) Bottom of Seat Pan**

2. Due to inadvertent releases of the upper hangers during impact, the seat upper attachments points were modified to ensure they did not disconnect during the tests. Tie wraps were used to secure down the release levers and were then wrapped with duct tape.



**Figure 6. Wrapped upper attachments**

3. Due to submarining of the manikin during impacts, modifications to the standard 4-point and prototype airbag restraints were made to ensure the manikin pelvis stayed in position during the impact. Two different types of modifications were made:

A. Two additional belts were attached to the lap belt attachments points and were fed under the manikin's legs and connected to the lap belt near the buckle. This created a 'crotch strap' that kept the manikin's pelvis in position during the impact, eliminating the submarining effect. This is seen in Figure 7 (L).

B. Due to structural failure of the first crotch strap modification during Pure Horizontal (PH) testing, a second type of restraint modification was made. Two straps were attached to the left and right lap belt mount points and fed through the

legs of the manikin. These restraint belts were looped around the existing lap belts to the side of the restraint buckle. The H-60A/L gunner's belt has a similar configuration. This is seen in Figure 7 (R).



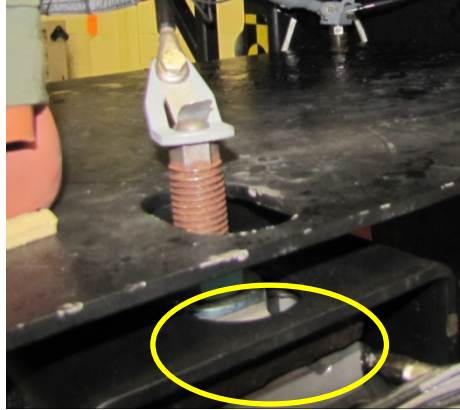
**Figure 7. Restraint modifications (L) Single Strap (R) Double Strap**

The seat instrumentation included three linear accelerometers encapsulated in a disk that was taped to the top of the seat pan fabric just under the manikin's buttocks. This is seen in Figure 8.



**Figure 8. Seat Pan Accelerometer Pack**

A three-axis load cell was mounted at each seat attachment point (4 feet, 2 hangers) and used to record seat loads into the fixture. This is seen in Figure 9.



**Figure 9. Seat Fixture Load Cell**

For all HIA rigid seat tests, a displacement transducer (string potentiometer) was used to measure the distance the manikin's neck traveled during the impact event. This is seen in Figure 10.



**Figure 10. Neck Displacement Transducer**

#### **4.6 Restraints**

AmSafe (Phoenix, AZ) was contracted to develop and provide 16, H-60 seat airbag restraints. The restraint can be seen in Figure 11. These prototype and standard restraints were used and compared in this program. Velcro restraints were used for some tests to limit limb flail and reduce the risk of damaging the manikins.



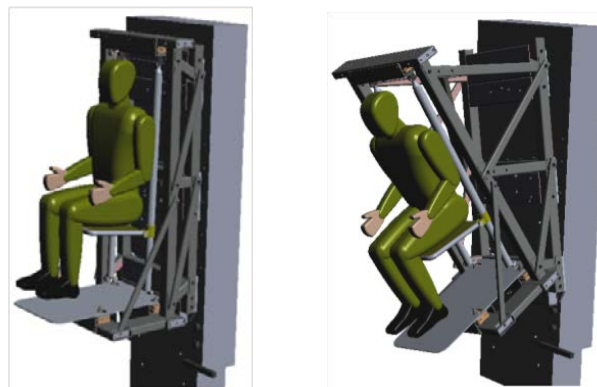


**Figure 11. Airbag Restraint (L) Uninflated (R) Inflated**

#### **4.7 Seat Orientations**

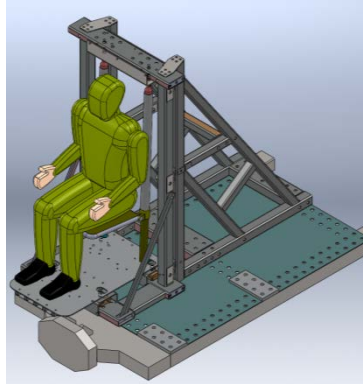
The troop and rigid seats were tested in three different orientations. Two of these orientations were tested using the VDT.

- (1) Pure Vertical (PV) – the seat has no offset relative to the positive z-axis acceleration pulse.
- (2) Combined Vertical (CV) – 30 degree pitch forward, 10 degree roll relative to the positive z-axis acceleration pulse.



**Figure 12. (L) Pure and (R) Combined Vertical Configurations Completed on the VDT**

The Pure Horizontal (PH) orientation was completed using the HIA. This ‘eyeballs out’ orientation had the manikin facing the thrust pin with no yaw or roll relative to the x-axis acceleration pulse (Figure 14).



**Figure 13. Pure Horizontal Configuration Completed on the HIA**

Testing configurations were based on MIL-S-85510(AS) and previous testing of the legacy H-60A/L troop seat (Sikorsky Document SER-70102). It is noted that the rise times for the CV and PV tests are roughly half of what is required to meet MIL-S-85510(AS) yet the acceleration and velocity were near that of the spec. The experimental test matrix is summarized in Table 2.

**Table 2. Test Matrix**

Cell	Orientation	Seat	Restraint	Manikin		G	Delta V (ft/s)	Tests
A	PH	Rigid	Standard	50%ile HB3	QUAL	18	46	8613, 8614, 8615
B	PH	Rigid	Standard	50%ile HB3	MIL-STD	24	53	8616, 8617, 8618, 8619
C	PH	H-60A/L	Standard	50%ile HB3	QUAL	18	46	8621
D	PH	H-60A/L	Airbag	50%ile HB3	QUAL	18	46	8622
E	PH	H-60A/L	Standard	Aero 95%ile	MIL-STD	24	46	8623
F	PH	H-60A/L mod	Standard	LARD	MIL-STD	24	53	8707
G	PH	H-60A/L mod	Airbag	LARD	MIL-STD	24	53	none
H	PV	H-60A/L	Standard	50%ile HB3	QUAL	16	31	6276, 6277
I	PV	H-60A/L	Airbag	50%ile HB3	QUAL	16	31	none
J	PV	H-60A/L	Standard	50%ile HB3	MIL-STD	35	47	6278, 6280
K	PV	H-60A/L	Airbag	50%ile HB3	MIL-STD	35	47	6279
L	PV	H-60A/L mod	Airbag	50%ile HB3	MIL-STD	35	48	6281
M	PV	H-60A/L mod	Standard	50%ile HB3	MIL-STD	35	48	6282
N	PV	H-60A/L mod	Standard	LARD	MIL-STD	35	48	6283
O	CV	H-60A/L mod	Standard	LARD	QUAL	24	39	6287
P	CV	H-60A/L mod	Airbag	LARD	QUAL	24	39	6286
Q	CV	H-60A/L mod	Standard	LARD	MIL-STD	35	48	6284
R	CV	H-60A/L mod	Airbag	LARD	MIL-STD	35	48	6285
S	PH	Rigid	Airbag	50%ile HB3	QUAL	18	46	8711
T	PH	Rigid	Airbag	50%ile HB3	MIL-STD	24	53	8712
U	PH	H-60A/L Mod	Std	50%ile HB3	QUAL	18	46	8704, 8705
V	PH	H-60A/L Mod	Airbag	50%ile HB3	QUAL	18	46	8706

## 4.8 Data Acquisition

The HIA's Master Instrumentation Control Unit in the Instrumentation Station beside the HIA facility controlled data acquisition. Using a comparator, a test was initiated when the countdown clock reached zero. The comparator was set to start data collection at a pre-selected time. All data were collected at 1,000 samples per second and filtered at a 120 Hz cutoff frequency using an 8-pole Butterworth filter. Table 3 lists the data channels recorded for this program.

The restraint instrumentation included in-line belt load cells (Figure 12). Prior to each test, the restraint lap and shoulder belts were pre-tensioned (tightened) to 20 lb.  $\pm$  5 lb when possible. Use of the load cells on the lap belt was not possible for all tests given the length of the belts. When not used the belts were essentially 'bottomed out'. This pre-tensioning was completed by the same technician for every test in order to assure consistency between tests. For reference the 20lbs  $\pm$  5lbs is borderline uncomfortable for human subjects, based on the extensive database of human testing conducted on the HIA.

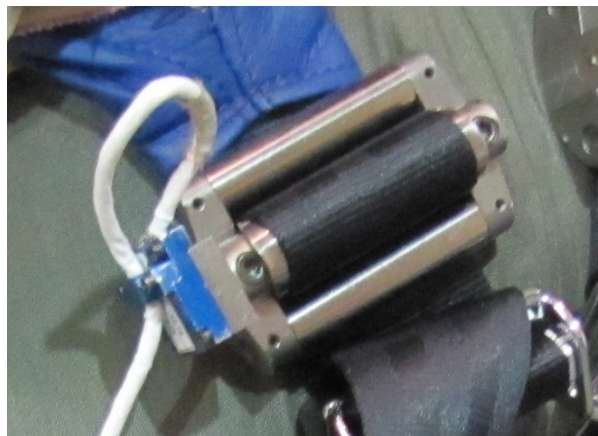


Figure 14. Restraint Belt Load Cell

Accelerometers and load transducers were chosen to provide the optimum resolution over the expected test load range. Full-scale data ranges were chosen to provide the expected full-scale range plus 50% to assure the capture of peak signals. All transducer bridges were balanced for optimum output prior to the start of the program. The accelerometers were adjusted in software for the effect of gravity by adding the component of a 1 G vector in-line with the force of gravity that lies along the accelerometer axis.

The linear accelerometers were wired to provide a positive output voltage when the acceleration experienced by the accelerometer was applied in the +x, +y and +z directions. The load cells were wired to provide a positive output voltage when the force exerted by the load cell on the subject was applied in the +x, +y or +z direction. The angular accelerometers were wired to provide a positive output voltage when the angular acceleration experienced by the sensor was applied in the +y direction according to the right-hand rule.



The manikin upper neck load cells were wired to provide a positive output voltage when the force exerted by the load cell on the body segment was applied in the +x, +y or +z direction. Finally, the manikin torque transducers were wired to provide a positive output voltage when the torque experienced by the transducer was applied in the +x, +y or +z direction.

Facility instrumentation included linear accelerometers, velocity tachometers mounted to the sled and tower carriages, and linear accelerometers mounted to the fixture. Manikin instrumentation consisted of 6-axis load cells mounted at the head/neck junction and lumbar/pelvis junction (Fx, Fy, Fz, Mx, My, Mz) as well as three linear accelerometers (X, Y, Z) and an angular accelerometer (Ry) mounted in the head. Three linear accelerometers (X, Y, Z) were mounted in the chest, and a tri-axial (X, Y, Z) accelerometer was mounted in the pelvis. Data channels recorded are shown in Table 3.

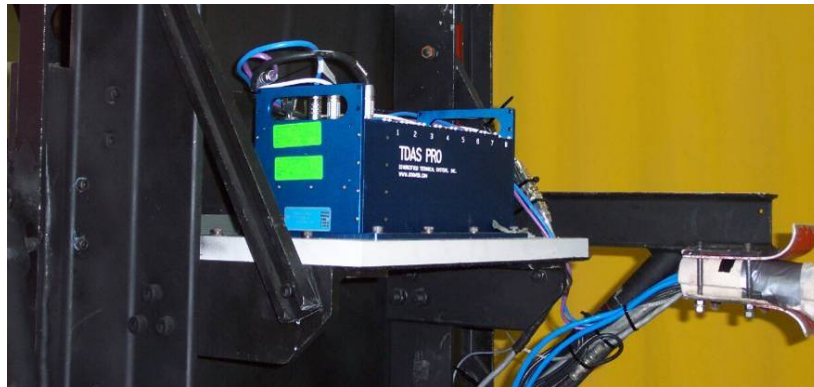
**Table 3. Data Channels Recorded**

Carriage X, Y, and Z Acceleration (G)
Seat Fixture X, Y, and Z Acceleration (G)
Seat Pan X, Y, and Z Acceleration (G)
Top Left Seat Mount X, Y, and Z Force (LB)
Top Right Seat Mount X, Y, and Z Force (LB)
Bottom Left Front Seat Mount X, Y, and Z Force (LB)
Bottom Right Front Seat Mount X, Y, and Z Force (LB)
Bottom Left Rear Seat Mount X, Y, and Z Force (LB)
Bottom Right Rear Seat Mount X, Y, and Z Force (LB)
Left Torso Restraint Force (LB)
Right Torso Restraint Force (LB)
Left Lap Restraint Force (LB)
Right Lap Restraint Force (LB)
Internal Head X, Y, and Z Acceleration (G)
Internal Head Y Angular Acceleration (Radians/Sec <sup>2</sup> )
Internal Upper Neck X, Y, and Z Force (LB)
Internal Upper Neck Moment X, Y, and Z Torque (IN-LB)
Internal Lower Neck X, Y, and Z Force (LB)
Internal Lower Neck Moment X, Y, and Z (IN-LB)
Internal Chest X, Y, and Z Acceleration (G)
Internal Chest Y Angular Acceleration (RAD/SEC <sup>2</sup> )
Internal Lumbar X, Y, and Z Acceleration (G)
Internal Lumbar X, Y, and Z Force (LB)
Internal Lumbar Moment X, Y, and Z Torque (IN-LB)
Linear Neck Displacement X (In.) – HIA rigid seat tests only

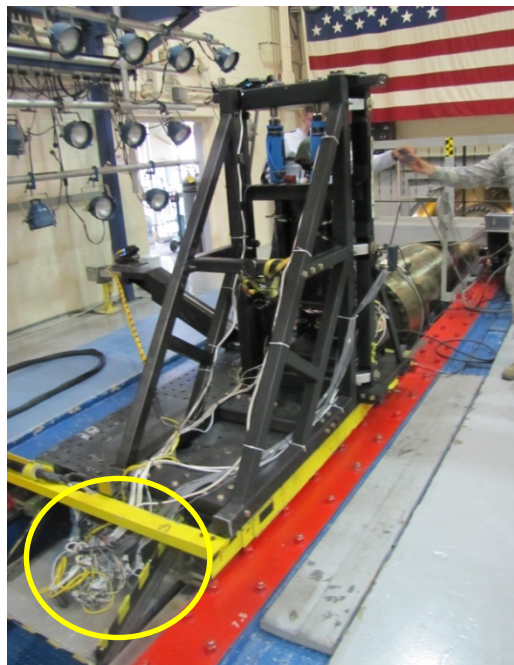
Prior to putting the manikin in the seat, data was recorded to establish a zero reference for all sensors. The reference data was stored separately from the test data and was used in the processing of the test data. A reference mark pulse was generated to mark the electronic data

at a pre-selected time after test initiation to place the reference mark close to the impact point. The reference mark time was used as the start time for data processing of the electronic data.

The TDAS PRO Data Acquisition System (DAS), manufactured by Diversified Technical Systems (DTS), Inc., was used for this test program. The TDAS PRO is a ruggedized, DC powered, fully programmable signal conditioning and recording system for transducers and events. The TDAS PRO was designed to withstand a 100 G shock. The main unit was installed on top of the VDT seat carriage as shown in Figure 15 and at the back of the HIA sled as shown in Figure 16.



**Figure 15. TDAS PRO Data Acquisition System on Top of VDT Carriage**



**Figure 16. TDAS Pro Data Acquisition System at the Back of HIA Sled**

The TDAS PRO can accommodate up to 64 channels. The signal conditioning accepts a variety of transducers including full and partial bridge, voltage, and piezoresistive. Transducer signals are amplified, filtered, digitized and recorded in on-board solid-state memory.

Infoscitex coordinated all pre- and post-calibrations on all sensors. For this test program, a record was made identifying the data channel, transducer manufacturer, model number, serial number, date and sensitivity of pre-calibration, date and sensitivity of post-calibration, and percentage change. Pre- and post-calibration information is maintained with the program data.

Calibrations for all instrumentation were performed prior to the start of this test program. Post calibrations were done to confirm the accuracy and functional characteristics of the transducers.

The comparison method (Bouche 1970) was used to calibrate the laboratory accelerometers. A laboratory standard accelerometer, calibrated on a yearly basis by Endevco with standards traceable to the National Bureau of Standards, and a test accelerometer were mounted on a shaker table. A random noise generator drove the shaker table, and the accelerometer output was collected. The frequency response and phase shift of the test accelerometer was determined by using Fourier analysis on a PC. The natural frequency and the damping factor of the test accelerometers were determined, recorded and compared to previous calibration data for that test accelerometer. Sensitivities were calculated at 20 G and 100 Hz. The sensitivity of the test accelerometer was determined by comparing its output to the output of the standard accelerometer.

The load cells used in this study were calibrated to a laboratory standard load cell in a special test fixture. The sensitivity and linearity of each test load cell were obtained by comparing the output of the test load cell to the output of the laboratory standard under identical loading conditions.

#### **4.9 Video and Photography**

Two Phantom Miro 3 cameras (Figure 17) were used to collect high-speed video and target data. The program began with both cameras mounted on-board using a custom built camera rack. One camera was mounted perpendicular to the manikin while the other was above the manikin at an oblique (45°) angle. Test personnel were not satisfied with the ability of the lens to capture a wide enough view. It was decided one camera needed to be moved off-board for the HIA tests. This off-board camera was placed in-front of the sled and at an oblique angle, while the on-board camera was at the left and perpendicular to the manikin. Test personnel chose to place both cameras off-board for the VDT tests. One camera was placed below and in-front of the carriage, and the other camera was to the left and below the carriage. The Miro 3 system is capable of data acquisition at 800 x 600 at 1,200 frames per second (fps). All video was captured at 1,000 fps. The video files were downloaded and converted to AVI format and stored in the secure RHCP server.



**Figure 17. Phantom Miro 3 Camera**

Digital still photos were taken before and after each test including all damaged equipment.

#### **4.10 Evaluation Criteria**

Immediately following each test, the “quick look” data was evaluated to determine the adequacy of the test. This data consisted of all measurements except those that required computing. No further tests were performed until the quick-look data from the previous test had been printed out and given to the Test Conductor for review.

#### **4.11 Injury Criteria**

The injury probability metrics used are primarily taken from the Full Spectrum Crashworthiness (FSC) report (Bolukbasi et al 2011) as it incorporates the most recent recommended criteria for troop seating. Injury criteria for head, neck, chest, lumbar, and extremities are included. Not all criteria from the FSC report are used because they did not apply to the test setup used. For instance, the Head Injury Criterion (HIC) was not used because no aircraft structure was simulated during testing other than the single seat itself. Reporting of head-strike data could be misleading and irrelevant given the experimental setup used for this test series.

**Nij:** For neck injury probability, Nij is used as it is the most accepted and validated criteria in the X-Z plane. The Nij value will be calculated throughout the time history of the impact test according to the following formula:

$$N_{ij} = F/F_{int} + M/M_{int}$$

where:

F is the measured axial neck tension/compression or shear in pounds

$F_{int}$  is the critical intercept load

M is the measured flexion/extension bending moment in in-lbs

$M_{int}$  is the critical intercept moment

The Nij criteria do not apply to loading in pure tension or compression. Nij values are computed for each of the following combined loading cases:

$N_{te}$  = Tension - Extension  
 $N_{tf}$  = Tension - Flexion  
 $N_{ce}$  = Compression - Extension  
 $N_{cf}$  = Compression - Flexion

The critical intercept values for  $N_{ij}$  calculation at C0-C1 for this program are based on the use of the manikins used in this program.

**Table 4. Critical Intercept Values for  $N_{ij}$  Calculation at C0-C1 for a Given Occupant Size**

	<b>Small Female Hybrid III Type Manikin</b>	<b>Mid-Sized Male Hybrid III Type Manikin</b>	<b>Large Male Hybrid III Type Manikin</b>
<b>Tension (lbs) (+F<sub>z</sub>)</b>	964	1530	1847
<b>Compression (lbs) (-F<sub>z</sub>)</b>	872	1385	1673
<b>Flexion (in-lbs) (+M<sub>y</sub>)</b>	1372	2744	3673
<b>Extension (in-lbs) (-M<sub>y</sub>)</b>	593	1195	1584

$N_{ij}$  combines tension, compression, flexion, and extension of the upper neck to determine a probability of injury at a given injury level and is part of the JSF Neck Injury Criteria (NIC) (Nichols 2006). Though primarily developed and used in automotive environments,  $N_{ij}$  thresholds have been modified for military personnel in aircraft environments for different occupant sizes. A  $N_{ij}$  value of 0.5 correlates to a 10% probability of an Abbreviated Injury Scale (AIS)  $\geq 3$  neck injury.  $N_{ij}$  can be calculated for both upper and lower neck locations. Only upper neck  $N_{ij}$  is reported for this program.

The Abbreviated Injury Scale (AIS) is an anatomical scoring system first introduced in 1969. Since that time it has been revised and updated against survival so that it now provides a reasonably accurate way of ranking the severity of injury. The latest incarnation of the AIS score is the 1990 revision. The AIS is monitored by a scaling committee of the Association for the Advancement of Automotive Medicine.

Injuries are ranked on a scale of 1 to 6, where 1 is minor, 5 is severe, and 6 an unsurvivable injury (Table 5). This represents the 'threat to life' associated with an injury and is not meant to represent a comprehensive measure of severity. The AIS is not an injury scale, in that the difference between AIS 1 and AIS 2 is not the same as that between AIS 4 and AIS 5.

**Table 5. Abbreviated Injury Scale Scores and Associated Injury**

<b>AIS Score</b>	<b>Injury</b>
1	Minor
2	Moderate
3	Serious
4	Severe
5	Critical
6	Unsurvivable

A limitation of Nij is that it was developed primarily for +/-X accelerations and does not report off-axis injury probability. The Upper Neck Moment Index X (UNMIx) and Upper Neck Moment Index Z (UNMIz) were developed by the Navy to look at off-axis neck injury probability (Nichols 2006). These criteria are part of the JSF NIC and use both linear force and neck moments, just like Nij, to determine a neck injury probability. As a guideline an UNMIx or UNMIz value of 0.5 correlates to a 10% probability of a neck injury. Validation of the criteria has been limited; however, the UNMIx and UNMIz are reported in this study for comparison.

**Restraint Loads:** For chest injury, both chest acceleration and belt forces were collected during testing. The FSC Report recommends restraint belt force for injury probability. The criteria states that for one torso belt, the peak force must be less than 1750lb. For more than one torso restraint belt, the total peak force must be below 2000lb. All seats tested during this program utilized 4-point restraints, thus the 2000lb limit is most applicable. For the majority of testing, all four belts (left and right torso straps, left and right lap belt) were instrumented. However, lap belt force cells were not used during all tests due to the manikin fit within the seat, design of the seat, or length of available belts to instrument.

A chest resultant acceleration limit of 60G (Mertz 1989) for manikins is discussed within the FSC, though the FSC does not recommend its use. Instead, the FSC recommends use of the torso belt peak loads. The reason for this is that the torso belt loads and the chest resultant acceleration criteria should show similar results in some orientations. For this study the chest resultant accelerations are used because thoracic organ injury is caused by acceleration.

**Lumbar Loads:** Lumbar injury probability is determined from limits derived by Desjardins (2008). The Desjardins lumbar force limits are based on 19.9 times the manikin's weight above the lumbar load cell. For a 95% percentile Hybrid III, this correlates to a 1757 lb compression limit. For the specific manikins used in this test program, the limits are 1532 lbs for the HB50 (based on manikin and instrumentation weight above the lumbar load cell equal to 77lbs), and 2235 lbs for the LARD (based on manikin and instrumentation weight above the lumbar load cell equal to 112.3 lbs).

**Whole Body:** A whole-body injury criteria discussed in the FSC is Eiband, which was developed in the late 1950s. The Eiband criteria pre-dates specific body-region injury criteria for seats (Eiband 1958). Based on a literature review, Eiband developed acceleration-duration curves for each body-axis providing a no injury/moderate injury/severe injury rating system. The limitation of this work is that a nominal trapezoidal pulse is used. Pulses from the VDT and HIA are nominally half-sinusoidal instead of trapezoidal, thus using the Eiband criteria is questionable. In addition, use of Eiband is questioned given the 60+ years of specific body-region injury work that has been accomplished since the Eiband criteria was published, especially if specific neck, chest, and lumbar criteria is inconsistent with the results of Eiband. Eiband was reported for the PV tests for comparison.

Figure 18 shows the definitions of the "Degree of Injury" given in the Eiband report. The 'Moderate' injury is one that can be survived but may include extremity, skull, and lumbar

fractures as well as loss of consciousness for a period of time. The 'Moderate' injury is very broad in definition and in some cases much more extreme than the other injury probability models used. The assumption is that a 'survivable' crash is one that does not require immediate egress from the rotorcraft or immediate medical care. A seat with an Eiband injury probability of 'Moderate' shows that the impact will cause some sort of injury, though the level and probability of specific types of injury can only be shown in the specific body area criteria.

TABLE II. - SCALE OF INJURY\* USED BY CORNELL CRASH INJURY RESEARCH IN CLASSIFYING DEGREE OF BODY INJURY (REF. 51)

	Degree of injury	Classification and description of injury	Degree of injury in this report
		A. Minor or none	
1	No injury		Undeclared
2	Minor	"Minor" contusions, lacerations, abrasions in any area(s) of the body. Sprains, fractures, dislocations of fingers, toes, or nose. Dazed or slightly stunned. Mild concussion evidenced by mild headache, with no loss of consciousness.	Moderate
		B. Nondangerous	
3	Moderate	"Moderate" contusions, lacerations, abrasions in any area(s) of the body. Sprains of the shoulders or principal articulations of the extremities. Uncomplicated, simple or green-stick fractures of extremities, jaw, or malar structures. Concussion as evidenced by loss of consciousness not exceeding 5 minutes, without evidence of other intracranial injury.	Moderate
4	Severe but not dangerous (survival normally assured)	Extensive lacerations without dangerous hemorrhage. Compound or comminuted fractures, or simple fractures with displacement. Dislocations of the arms, legs, shoulders or pelvis/acetabular processes. Fracture of transverse and/or spinous processes of the spine, without evidence of spinal-cord damage. Simple fractures of vertebral bodies of the dorsal and/or lumbar spines, without evidence of spinal-cord damage. Compression fractures of L-3-4-5. Skull fracture without evidence of concussion or other intracranial injury. Concussion as evidenced by loss of consciousness from 5 to 30 minutes, without evidence of other intracranial injury.	Moderate
		C. Dangerous to life	
5	Serious-dangerous (but survival probable)	Lacerations with dangerous hemorrhage. Simple fractures of vertebral bodies of the cervical spine, without evidence of spinal-cord damage. Compression fractures of vertebral bodies of dorsal spine and/or of L-1 and L-2, without evidence of spinal-cord damage. Crushing of extremities, or multiple fractures. Indication of moderate intrathoracic or intra-abdominal injury. Skull fracture with concussion as evidenced by loss of consciousness from 5 to 30 minutes. Concussion as evidenced by loss of consciousness from 30 minutes to 2 hours, without evidence of other intracranial injury.	Severe
6	Critical-dangerous (survival uncertain or doubtful)	(Includes fatal terminations beyond 24 hours.) Evidence of dangerous intrathoracic or intra-abdominal injury. Fractures or dislocations of vertebral bodies of cervical spine with evidence of cord damage. Compression fractures of vertebral bodies of dorsal spine and/or L-1, L-2, with evidence of spinal-cord damage. Skull fracture, with concussion as evidenced by loss of consciousness from 30 minutes to 2 hours. Concussion as evidenced by loss of consciousness beyond 2 hours. Evidence of critical intracranial injury.	Severe
		D. Fatal degrees of injury	
7	Fatal within 24 hours of accident	Fatal lesions in single region of the body, with or without other injuries to the 4th degree.	Not used
8	Fatal within 24 hours of accident	Fatal lesions in single region of the body, with other injuries to the 5th or 6th degree.	Not used
9	Fatal	Two fatal lesions in two regions of the body, with or without other injuries elsewhere.	Not used
10	Fatal	Three or more fatal injuries - up to demolition of body	Not used

\*Based on observations during first 48 hours after injury and previously normal life expectancy.

Figure 18. Eiband Injury Levels

## 5.0 RESULTS

### 5.1 Test Overview

Testing began on AFRL's Horizontal Impact Accelerator (HIA) in the Pure Horizontal (PH) orientation using the custom-built rigid seat. An AmSafe test engineer was present for the first week of testing to assist and ensure the proper use of the airbag restraints and associated equipment. Dr. Pete Mapes (OSD) was also present for testing during this first week helping direct the research and suggesting modifications to the test plan and equipment.

All of these tests (HIA8613-8619) were done using the rigid seat, the mid-sized manikin, and the standard 4-pt restraint. Tests 8613-8615 were done at 18G and the other three at 24G. Seven HIA impacts into the PH testing using the AmSafe built rigid seat, a shoulder restraint mount broke. At that time it was decided to continue testing with the H-60A/L troop seats until the rigid seat could be repaired and "ruggedized." One standard restraint test (HIA8621) and one airbag restraint test (HIA8622) were completed in the PH orientation at 18G using the H-60A/L seat and mid-sized manikin. Additionally, one 24G PH shot using a 95<sup>th</sup> percentile manikin (not LARD), the H-60A/L seat and standard restraint was completed in the PH orientation prior to moving to the VDT. The 95<sup>th</sup> percentile manikin was used in lieu of the instrumented LARD in order to ensure the seat and restraint would restrain the manikin and not damage the instrumented LARD.

To summarize the initial HIA testing, the mid-sized male manikin was used for all rigid seat tests, resulting in no notable differences (manikin motion, manikin response) between the standard and airbag restraints. The rigid seat shoulder restraint mount broke after the fourth 24G shot. The first HIA tests completed using the H-60A/L seat, mid-sized manikin, standard restraint at 18G (HIA8621-8622) resulted in good tests involving seat stroking/energy attenuation but with increased manikin submarining as compared to the rigid seat. The high energy shot (24G) using the H-60A/L seat and large manikin resulted in a near complete stroke of the seat and even more manikin submarining. It was observed that during impact, the front of the seat pan dips/pitches forward, allowing additional space for the occupant's pelvis and lower extremities to rotate and submarine out the front of the seat. Manikin submarining was noticed in all tests but especially with the H-60A/L seats causing concern related to meeting the program objectives. It was concluded that the 4-point harness is not sufficient to keep the occupant in the seat during hard or crash landings in these horizontal orientations.

To mitigate this submarining issue, a belt with a crotch strap and a strap that connects under the thighs/buttocks was added to the H-60A/L seat after conducting the first 4 tests on the VDT for the PV test configuration. This modification effectively secured the occupant with a modified version of a "5-point restraint." Testing with this 5-pt restraint configuration was then used to complete the testing on the VDT in the PV and CV orientations, and the for the final 2 HIA tests.

A total of eight Pure Vertical (PV) tests and 4 Combined Vertical (CV) tests were conducted on the VDT. The lower energy PV drops (16G) with the mid-sized manikin and standard restraint resulted in the seat stroking about 25-50% with no notable issues. These tests (VDT 6276-6277) were successful with no equipment breakage. An airbag restraint was not tested in this configuration. However, the high energy PV drops (35G) resulted in the mid-sized manikin ripping through the seat pan fabric and causing significant seat frame and



attachment failures/fractures (VDT6778-6779). It was deemed necessary to modify the seat fabric and harness to enable an objective evaluation of the test program objectives. Fabric from a prototype H-60 seat was used to cover the legacy H-60 seat. Likewise, the standard 4-pt harness was modified to become a 5-pt harness by adding the single crotch strap and thigh straps under the thighs/buttocks. These modifications proved effective, allowing the remaining PV tests (VDT6281-6284) to be completed without concern of the manikin ripping through the seat pan fabric or submarining forward and out of the seat. PV tests done with a LARD manikin (largest male manikin), at the high energy, resulted in some seat attachment point failures and seat strokes of nearly 100%, but the manikin stayed coupled to the seat and in acceptable condition.

The airbag restraints appear to provide slightly better protection than a standard restraint in the PV configurations. However, the addition of the extra layer of fabric on the seat pan and the incorporation of the thigh/crotch straps made a significant difference in the structural integrity of the seat and mitigation of occupant injury risk.

Four Combined Vertical (CV) tests (VDT6284-6287) were then completed with the LARD manikin, and H-60A/L modified seats. The modifications included the additional seat fabric and thigh and single crotch strap (5-pt harness configuration). Two tests were done at the high energy (35G), and two at a mid-range energy (26G). The standard and airbag restraints were tested at both levels.

These LARD CV tests were all successful with no damage to the seats or manikins. The seats stroked approximately 75%. The restraints successfully coupled the manikin within the seat with no notable submarining. The airbag restraint appeared to provide slightly better protection than a standard restraint in the CV configurations, based on evaluation of the injury criteria.

The final six tests of this program were completed on the HIA (HIA8704-8707, 8711-8712). The first 3 tests were done at 18G with the modified H-60A/L seats, mid-sized manikin, and either the airbag or standard restraint. The single crotch strap's buckle broke during the first test, and it was decided to try a dual crotch strap that attached to the lap belt rather than terminating into the turnbuckle. The dual strap proved successful in the following two tests. The seats stroked approximately 50%. The final test using the H-60 seat was done at 24G with the LARD manikin, and standard restraint (dual crotch strap). The combination of the large manikin, high energy (24G), and a restraint that ensured the manikin stayed coupled to the seat proved too much for the seat frame to handle as it broke at the point where the lap belt connects to the seat frame. The seat stroked 100%.

The final two tests on the HIA were completed with the ruggedized rigid seat, mid-sized manikin, and airbag restraints. One test was done at the lower energy level (18G) and the other at the higher energy level (24G). Both tests were successful and did not result in equipment damage. The airbag restraints provided slightly better protection than the standard restraint, lessening thorax movement and limb flail.

## 5.2 Test-by-Test Description

Below is a test-by-test description of the tests useful for comparison within the program. Not all tests are discussed as several did not meet the test conditions required for comparison.

### **HIA8615 – Cell A, PH, Rigid Seat, 4-pt Restraint, HB50, 17.76G, 46.74ft/s, 71ms rise time**

HIA8615 was the first PH test useful for comparison with the airbag restraints. The manikin's pelvis slid forward during the impact, though the restraint successfully controlled the manikin's upper torso. There was flailing of the manikin's arms and legs. All the manikin data used for injury probability prediction was successfully collected during the impact.

### **HIA8619 – Cell B, PH, Rigid Seat, 4-pt Restraint, HB50, 23.92G, 52.93ft/s, 67ms rise time**

There was flailing of the manikin's arms and legs. The manikin's pelvis slid forward on the seat pan and the torso came off the seat back during the impact, though the restraint successfully controlled torso motion. All the manikin data used for injury probability prediction was successfully collected during the impact.

### **HIA8621 – Cell C, PH, H-60A/L Seat, 4-pt Restraint, HB50, 17.89G, 46.1ft/s, 74ms rise time**

HIA8621 was the first test with the H-60A/L seat. During the impact the front of the seat pan dipped, allowing greater motion of the manikin's pelvis than that of the rigid seat. This led to greater submarining of the manikin's pelvis during the impact, allowing the manikin to come out of position. The restraint buckle was further embedded into the manikin's abdomen and chest. Post-test, the manikin's pelvis was on the front of the seat pan. The manikin's arms and legs flailed. The seat stroked properly, though the front right floor attachment detached. Figure 19 shows the flailing and submarining of the manikin during impact.

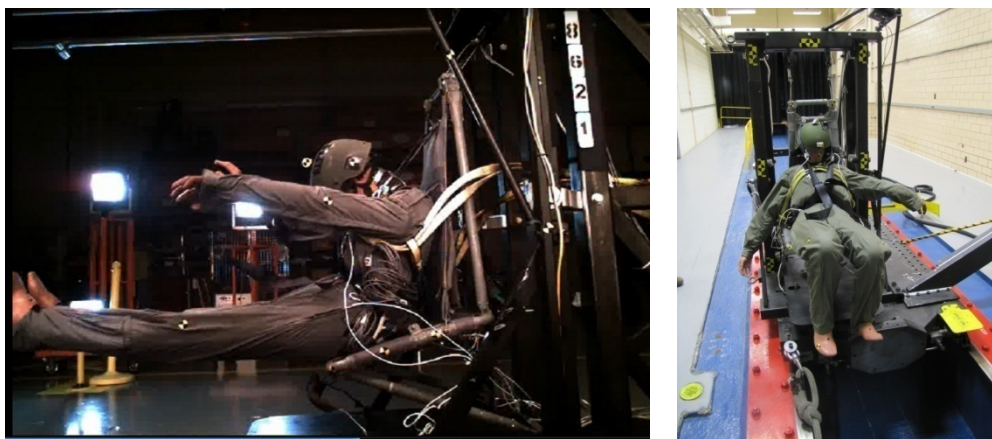
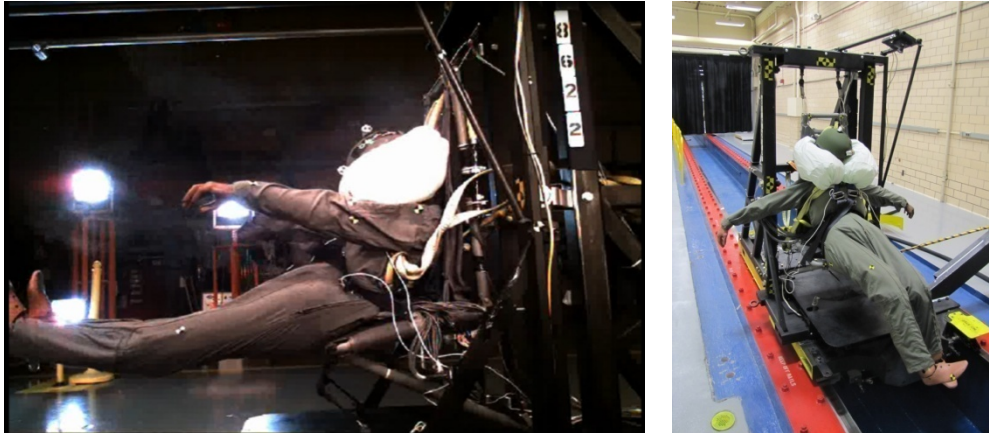


Figure 19. HIA8621 (L) Manikin submarine and seat pan dipping (R) Post test manikin position

**HIA8622 – Cell D, PH, H-60A/L Seat, Airbag Restraint, HB50, 17.9G, 46.39ft/s, 74ms rise time**

HIA8622 was the first test with the airbag restraint coupled with the H-60A/L seat. Similar to HIA8621 the seat pan dipped during the test and allowed the manikin's pelvis to submarine during the impact (Figure 20). The restraint buckle was further embedded into the manikin's abdomen and chest. The seat stroked properly, and all seat attachments to the fixture remained attached.



**Figure 20. HIA8622 (L) Manikin submarining and seat pan dipping (R) Post test manikin position**

**HIA8623 – Cell E, PH, H-60A/L Seat, 4-pt Restraint, VIP95, 25.17G, 53.15ft/s, 63ms rise time**

HIA8623 was solely run as a structural test to replicate MIL-STD qualification conditions. The test was conducted with a 95%ile large male manikin that was not instrumented. All MIL-STD conditions were not met, as the rise time meets the R&D level (46ms) but not the qualification level (81ms). Also, the seat mounting fixtures were not deformed. The back right seat mount came off during testing. Similar to the tests with the HB50 manikin, the seat pan dipped during testing, allowing the manikin's pelvis to submarine and failing to keep the manikin restrained in the seat (Figure 21).



Figure 21. HIA8623 (L) Manikin submarining (R) Post Test Manikin Position

**HIA8704 – Cell U, PH, H-60A/L Mod Seat, 4-pt Restraint w/Crotch, HB50, 18.01G, 46.73ft/s, 72ms rise time**

HIA8704 is the first PH test with the modified H-60A/L seat. During the impact the buckle broke, allowing the crotch strap to disengage. Similar to the previous PH tests with the non-modified H-60A/L seat, the crotch strap failure allowed the manikin to submarine in the seat pan (Figure 22).



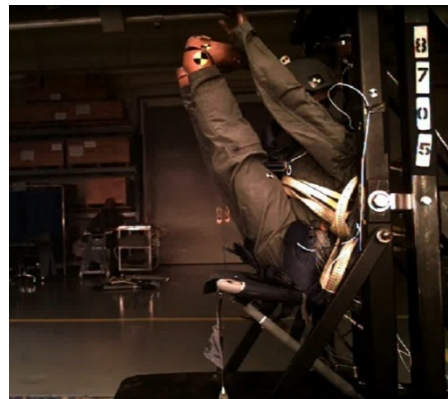




**Figure 22. HIA8704 Test (L) Manikin submarine (R) Post test (B) Buckle**

**HIA8705 – Cell U, PH, H-60A/L Mod 2 Seat, 4-pt Restraint w/Crotch, HB50, 18.2G, 46.53ft/s, 72ms rise time**

HIA8705 was the first test with the modified crotch strap restraint. While the seat pan dipped during the test, the modified restraint successfully kept the manikin's pelvis in position during the impact, and severe submarining of the manikin was not seen (Figure 23). In keeping the manikin secured, the rebound of the seat and manikin was significant. All seat attachments remained attached to the fixture.





**Figure 23. HIA8705 (L) Manikin flail (R) Rebound (B) Post test**

**HIA8706 – Cell V, PH, H-60A/L Mod 2 Seat, Airbag Restraint w/Crotch, HB50, 18.01G, 46.4ft/s, 72ms rise time**

HIA8706 was the second test with the modified crotch strap. The airbag inflated properly, and from the video, the airbags kept the arms from flailing up. There is still significant rebound of the seat and manikin legs after the initial impact (Figure 24). All data was successfully collected for the injury probability analysis.

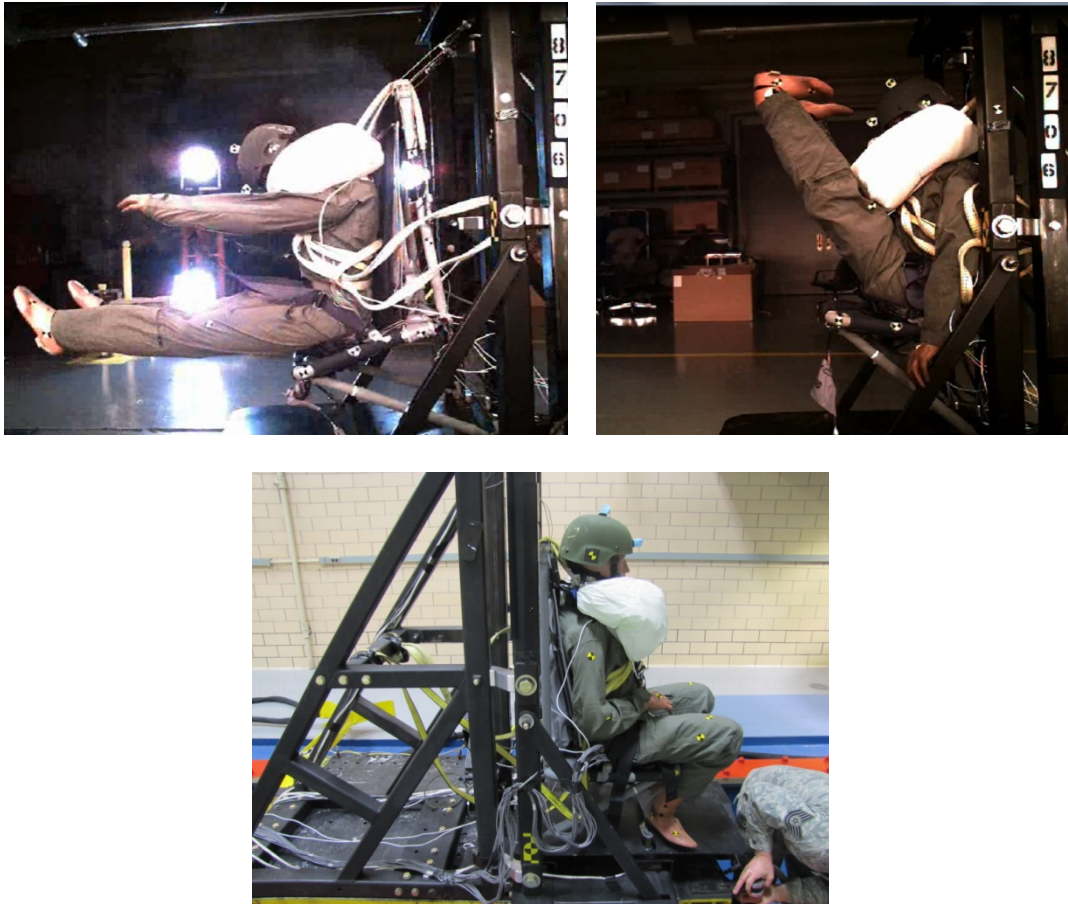


Figure 24. HIA8706 (L) Manikin flail (R) Rebound (B) Post test

**HIA8707 - Cell F, PH, H-60A/L Mod 2 Seat, 4-pt Restraint w/Crotch, LARD, 24.79G, 53.07ft/s, 66ms rise time**

HIA8707 is the first test with LARD and the modified crotch restraint. The back left foot detached during the test, and the front left broke. Also, the restraint mount broke the seat pan as the seat pan dipped during the impact (Figure 25). While adequate at near MIL-STD levels, this structural failure of the seat shows that the modifications to the restraint made by AFRL are operationally adequate. All data was successfully collected for the injury probability analysis.



Figure 25. HIA8710 (L) Manikin flail (R) Post test (B) Broken seat pan

**HIA8711 – Cell S, PH, Rigid Seat, Airbag Restraint, HB50, 17.54G, 46.52ft/s, 71ms rise time**

HIA8711 is the continuation of the rigid seat testing. The airbag restraint inflated properly. While legs and arms flailed, the manikin remained securely restrained in the seat. All data was successfully collected for the injury probability analysis.

**HIA8712 – Cell T, PH, Rigid Seat, Airbag Restraint, HB50, 23.81G, 52.89ft/s, 66ms rise time**

HIA8712 was the last rigid seat test with the airbag restraint. The airbag restraint inflated properly. All data was successfully collected for the injury probability analysis.

**VDT6279 – Cell K, PV, H-60 Seat, Airbag Restraint, HB50, 30.64G\*, 48.61ft/s, 28.7ms rise time**

The airbag restraint fired and inflated as expected. The manikin ripped through the seat pan (Figure 26). Note, the peak G is not consistent with previous testing. Several accelerometers were placed on the fixture to determine the cause of a lower recorded peak G. The other accelerometers were consistent with previous testing and the ability to compare data between this test and others are still valid.



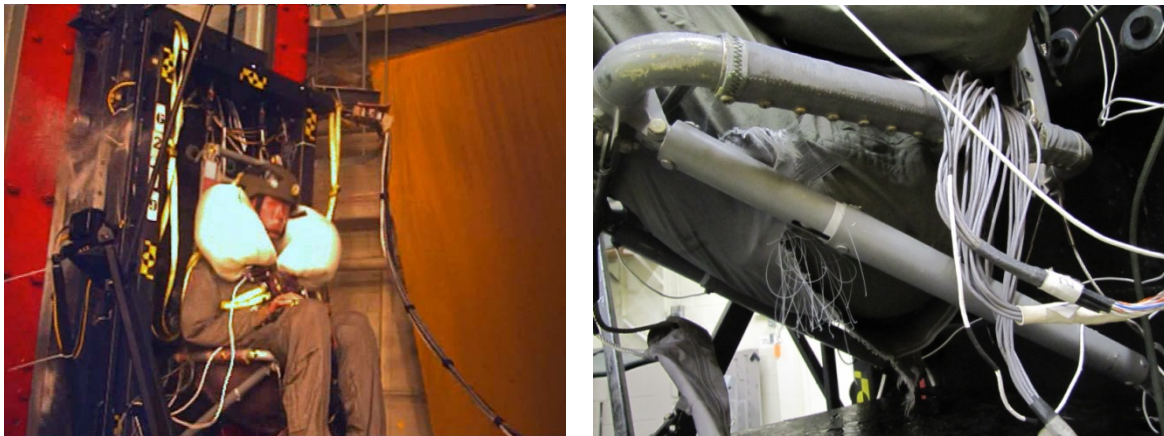


Figure 26. VDT6279 (L) Test (R) Seat pan failure

**VDT6280 – Cell J, PV, H-60 Seat, 4-pt Restraint, HB50, 30.18G\*, 48.65ft/s, 28.2ms rise time**

The manikin again ripped through the seat pan (Figure 27). It was determined post test that it was not possible to accomplish the goals of the program if the occupant was not properly restrained in the seat. Modifications to the seat were made for subsequent tests.



Figure 27. VDT6280 (L) Test (R) Seat pan failure

**VDT6281 – Cell L, PV, H-50 Mod, Airbag w/Crotch Restraint, HB50, 31.59G\*, 48.6ft/s, 27.6ms rise time**

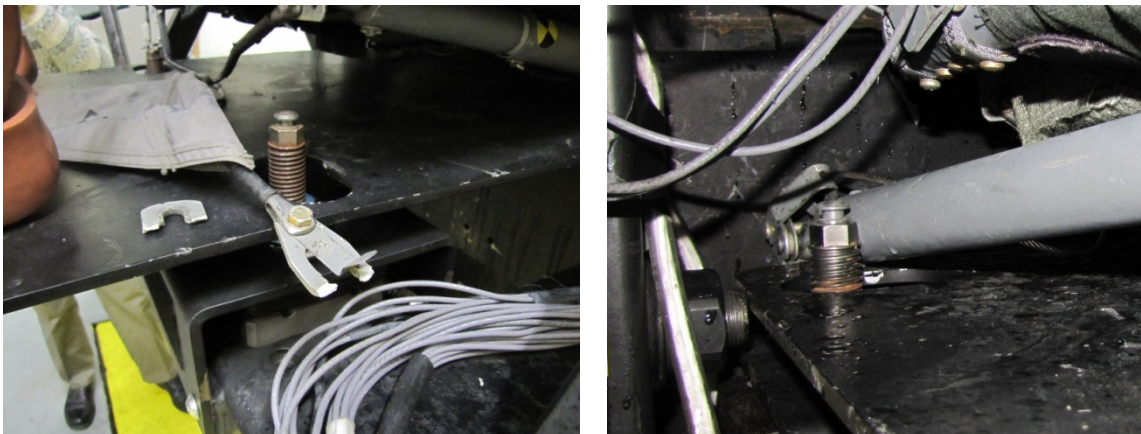
VDT6281 is the first test with the modified seat pan and single crotch strap. The modifications to the seat successfully kept the manikin in position during the impact and prevented the seat pan from ripping. While there was some ripping of the additional seat pan fabric layer, the primary seat pan fabric held. All seat mount points stayed attached to the fixture, and all data was successfully collected for the injury probability analysis.

**VDT6282 – Cell M, PV, H-60 Mod, 4-pt w/Crotch Restraint, HB50, 30.17G\*, 48.61ft/s, 24.8ms rise time**

VDT6282 was a repeat of the test conditions in VDT6281 but without the airbag restraint. The additional seat pan fabric and crotch strap were again included for this test. There was again ripping of the additional layer of fabric, though the primary seat pan fabric remained intact. All seat mount points stayed attached to the fixture, and all data was successfully collected for the injury probability analysis.

**VDT6283 – Cell N, PV, H-60MOD Seat, 4-pt w/Crotch Restraint, LARD, 33.31G\*, 48.95ft/s, 23.5ms rise time**

VDT6283 was conducted with LARD to ensure structural integrity of the modified seat. The front two floor mounts broke (Figure 28). The back right foot also became disengaged during the impact. However, the additional seat pan fabric was successful in keeping the manikin in the seat during the impact.



**Figure 28. VDT6283 (L) Front left attachment (R) Back right foot disengaged**

**VDT6284 – Cell Q, CV, H-60MOD Seat, 4-pt w/Crotch Restraint, LARD, 28.56G\*, 49.06ft/s, 24.4ms rise time**

The CV testing was not initially part of the airbag restraint program. However, after the seat failures and subsequent modifications to the seats, it was determined that it would be beneficial to run CV testing with LARD. This is a ‘worst case’ scenario with respect to structural integrity of the seat as well as seat performance. During VDT6284, all seat mount points stayed attached to the fixture and the seat structural integrity was confirmed with a large occupant at a high energy level at this orientation.

**VDT6285 – Cell R, CV, H-60MOD Seat, Airbag w/Crotch Restraint, LARD, 32.2G\*, 49.06ft/s, 25.2ms rise time**

The airbag restraint inflated as expected. All seat attachments stayed attached to the fixture. Although the manikin feet came off the platform, the manikin stayed restrained in the seat (Figure 29). The crotch strap prevented the restraint buckle from going up into the manikin’s

abdomen and chest. All seat mount points stayed attached to the fixture, and all data was successfully collected for the injury probability analysis.

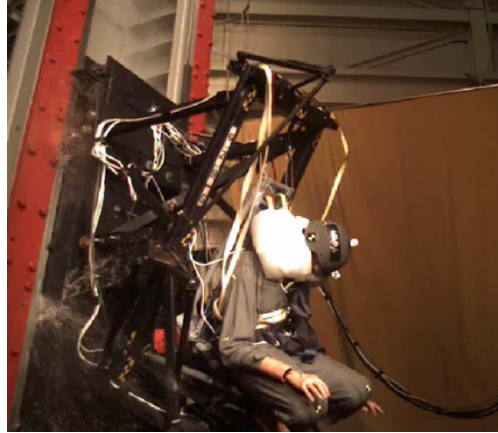


Figure 29. VDT6285 (L) Test (R) Post test (B) Airbag restraint

**VDT6286 – Cell P, CV, H-60MOD Seat, Airbag w/Crotch Restraint, LARD, 23.23G, 40.56ft/s, 28ms rise time**

VDT6286 was the first CV test conducted with a new seat. The modifications to the seat successfully kept the manikin restrained in the seat (Figure 30). All seat mount points stayed attached to the fixture, and all data was successfully collected for the injury probability analysis.





**Figure 30. VDT6286 Test**

**VDT6287 – Cell O, CV, H-60MOD Seat, 4-pt w/Crotch, LARD, 21.39G, 40.56ft/s, 31.6 ms rise time**

All attachments remained attached to the fixture. All seat mount points stayed attached to the fixture. The upper neck My channel was bad, meaning no neck injury probability can be calculated.

Table 6 gives the seat stroke data for each of the energy attenuators on the seat. The top lengths include the initial 7/8” distance the wire bender extends out of the seat structure.

**Table 6. Seat Stroke Distance (in)**

<b>Test #</b>	<b>Top Right</b>	<b>Top Left</b>	<b>Bottom Right</b>	<b>Bottom Left</b>
<b>HIA8621</b>	5.5	5.5	0	0
<b>HIA8622</b>	No Data	No Data	No Data	No Data
<b>HIA8623</b>	12.75	13	5.25	5.25
<b>HIA8704</b>	4	4	0	0
<b>HIA8705</b>	6	6	0	0
<b>HIA8706</b>	6.25	6.25	0	0
<b>HIA8707</b>	13.5	13.75	0	0
<b>VDT6276</b>	0	0	0	0
<b>VDT6277</b>	0	0	0	0
<b>VDT6278</b>	broken 1.75	13.50	0	0
<b>VDT6279</b>	6.5	6.25	0	0
<b>VDT6280</b>	5.5	6	0	0
<b>VDT6281</b>	11	10.75	0	0
<b>VDT6282</b>	8.5	8.5	0	0
<b>VDT6283</b>	13.5	13	0	0
<b>VDT6284</b>	9	9.25	0	0
<b>VDT6285</b>	13	13	0	0
<b>VDT6286</b>	8	7.75	0	0
<b>VDT6287</b>	8	8.25	0 in	0 in

## 6.0 DISCUSSION

### 6.1 Pure Horizontal Test Discussion

Table 7 is a comparison of the injury metrics for the PH rigid seat tests. The lower neck displacement between the standard and airbag restraints are very similar, thus the airbags did not significantly change the motion of the head and neck. There is a difference in torso belt peak forces between the standard and airbag restraints. The airbag restraints are significantly lower at both acceleration levels. The peak chest accelerations, however, were not changed. In addition there is no significant difference between the neck injury probabilities.

**Table 7. Rigid Seat PH Comparison HB50**

Test #	HIA8615	HIA8711	HIA8619	HIA8712
Cell	A	S	B	T
Restraint	STD	AIRBAG	STD	AIRBAG
Actual Acceleration (G)	17.76	17.54	23.92	23.81
Velocity (fps)	46.74	46.52	52.93	52.89
Bottom Neck Displacement (in.)	3.67	3.89	5.42	5.43
Torso Belt Peak Force (lb)	1616	1282	2005	1788
Chest Resultant Acceleration (G)	27.13	26.23	39.76	40.32
Peak Lumbar Compression (lb.)	974.3	1148.34	1744.28	1580.15
Peak Lumbar Tension (lb.)	485.05	110.84	504.2	134.68
Ntf	0.4257	0.3963	0.6167	0.5944
Nte	0.3274	0.3186	0.3199	0.4097
Ncf	0.0513	0.2610	0.0518	0.3052
Nce	0.2102	0.2007	0.2353	0.3632
UNMIx	0.1318	0.1509	0.1285	0.0610
UNMIz	0.0380	0.0413	0.0312	0.0503

Table 8 is a comparison of the injury metrics for the PH H-60A/L seat tests. HIA8621 and HIA8622 can be directly compared, though during these tests the manikin submarined out of the restraint as the seat pan dipped. Of interest there was a large peak lumbar tension in the airbag test, suggesting that the seat pan did not provide any support as the manikin came out of the restraint and seat. The peak lumbar tension between HIA8621 and HIA8704 (where the crotch strap broke) is very similar, suggesting that the addition of that crotch strap did not help restrain the manikin.

HIA8705 and HIA8706 are directly comparable between the standard and airbag restraints as the modifications to the seats kept the manikin in the seat. Peak torso belt loads for the airbag test are considerably lower than the standard restraint (1513lbs vs 2060lbs, respectively). The peak lumbar compression for the standard restraint is lower than the airbag, though both are well below the established limits. Neck injury probabilities between the two restraints are comparable.

**Table 8. H-60A/L Seat PH Comparison HB50**

Test #	HIA8621	HIA8622	HIA8704	HIA8705	HIA8706
Cell	C	D	U	U	V
Seat	H-60	H-60	H-60MOD	H60-MOD2	H60-MOD2
Restraint	STD	AIRBAG	STD W/CROTCH	STD W/CROTCH	AIRBAG W/CROTCH
Actual Acceleration (G)	17.89	17.9	18.01	18.2	18.01
Velocity (fps)	46.1	46.39	46.73	46.53	46.4
Torso Belt Peak Force (lb)	1827	1535	2025	2060	1513
Chest Resultant Acceleration (G)	28.55	24.75	30.58	23.6	21.52
Peak Lumbar Compression (lb.)	221.56	15.24	311.68	194.26	307.12
Peak Lumbar Tension (lb.)	618.52	1330.61	603.49	324.95	317.6
Ntf	0.6923	0.7436	0.7379	0.4435	0.4255
Nte	0.4135	0.3407	0.1765	0.2370	0.2921
Ncf	0.2941	0.0602	0.2267	0.1344	0.0803
Nce	0.0719	0.0166	0.3551	0.0990	0.1513
UNMIx	0.1102	0.1195	0.0891	0.0781	0.1262
UNMIz	0.0825	0.0710	0.0320	0.0368	0.0414

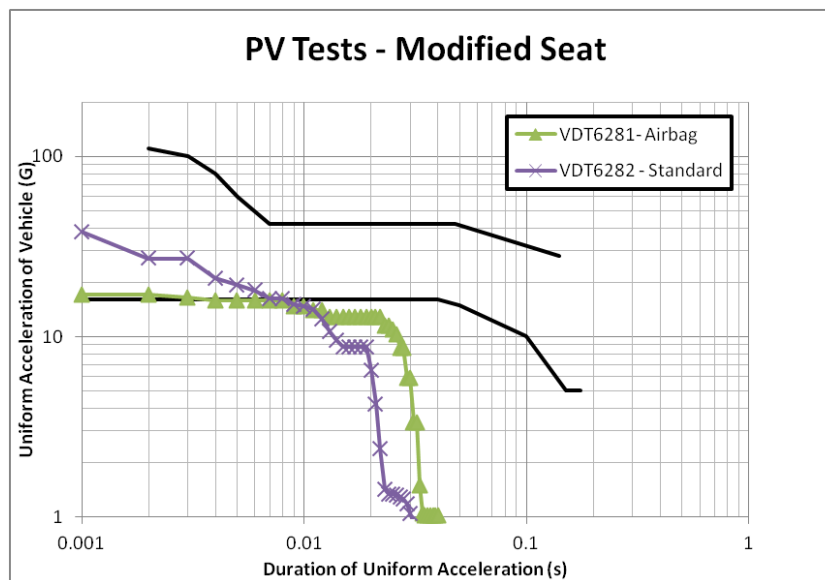
## 6.2 Pure Vertical Test Discussion

Table 9 summarizes the injury criteria for the PV testing at 35G with the HB50 manikin. VDT6279 and VDT6280 are tests without the seat modifications, and both tests experienced failure of the seat pan fabric. VDT6279 and VDT6281, standard restraint tests with and without seat modifications, can also be compared to determine injury probability if the seat properly restrains the occupant. The peak chest acceleration is lower for the modified seat, the peak lumbar compression is higher (which is expected if the seat pan is stays structurally intact), and the neck injury probability for the modified seat is lower in tension-flexion. As VDT6281 and VDT6282 incorporate the seat modifications and are directly comparable to determine the effect of the airbag restraint. The peak lumbar compression is lower, though the neck injury probabilities change between the configurations. The tension-flexion is higher (though within established limits) while the tension-extension is lower. Compression-flexion and compression-extension are also higher. However, all calculated Nij values are within established limits. HIA8706 showed that the airbag restraints are useful in keeping the arms from flailing above the manikin's head.

**Table 9. H-60A/L Seat PV Comparison 35g HB50**

Test #	VDT6279	VDT6280	VDT6281	VDT6282
Cell	K	J	L	M
Seat	H-60	H-60	H-60MOD	H-60MOD
Restraint	AIRBAG	STD	AIRBAG W/CROTCH	STD W/CROTCH
Peak Acceleration (G)	30.64	30.18	31.59	30.17
Velocity (fps)	48.61	48.65	48.6	48.61
Torso Belt Peak Force (lb)	204	384	331	185
Chest Resultant Acceleration (G)	37.12	22.54	28.95	27.54
Peak Lumbar Compression (lb.)	1231.47	1185.44	1430.58	1131.52
Peak Lumbar Tension (lb.)	218.86	392.35	138	140.25
Ntf	0.3610	0.3111	0.0703	0.2004
Nte	0.2765	0.1581	0.2316	0.0829
Ncf	0.3391	0.3197	0.2602	0.3674
Nce	0.0497	0.2242	0.1962	0.3379
UNMIx	0.1622	0.2154	0.1076	0.1199
UNMIz	0.0661	0.0532	0.0573	0.0199

Figure 30 shows seat pan Z accelerations plotted against the Eiband criteria. Both are within the ‘Moderate’ area of injury. The airbag restraint test is slightly better at short duration accelerations, though both seats fall into the “Voluntary Human Exposure” area for the longer duration accelerations.



**Figure 31. Eiband PV 35g**

### 6.3 Combined Vertical Test Discussion

Table 10 summarizes the injury criteria for the CV testing at 35G with the LARD manikin. All CV tests were conducted with the modifications to the seats. VDT6287 had a bad upper neck My, which prohibited comparison between the airbag and standard restraints with the crotch strap. Of note the peak accelerations listed have a wider range than normally allowed. Using backup fixture accelerometers, AFRL is certain the test conditions between the cells in comparison are still valid. Comparing the 35G data, the peak torso belt force is lower for the airbag. Also, the peak lumbar compression force is lower than with the standard restraint. Neck tension –flexion injury criteria is considerably higher than the standard restraint.

**Table 10. H-60A/L Seat CV Comparison LARD**

Test #	VDT6286	VDT6287	VDT6284	VDT6285
Cell	P	O	Q	R
Seat	H-60MOD	H-60MOD	H-60MOD	H-60MOD
Restraint	AIRBAG W/CROTCH	STD W/CROTCH	STD W/CROTCH	AIRBAG W/CROTCH
Peak Acceleration (G)	23.23	21.39	28.56	32.2
Velocity (fps)	40.56	40.56	49.06	49.06
Torso Belt Peak Force (lb)	1009	1267	1562	1270
Chest Resultant Acceleration (G)	21.05	21.27	35.6	36.41
Peak Lumbar Compression (lb.)	1441.18	1373.24	1578.69	1187.92
Peak Lumbar Tension (lb.)	176.79	237.68	477.56	411.08
Ntf	0.3208	Bad MY Channel	0.5855	1.2458
Nte	0.2048		0.1412	0.3083
Ncf	0.2032		0.0311	0.0894
Nce	0.0887		0.2368	0.0693
UNMIx	0.0555		0.1603	0.1006
UNMIz	0.0823		0.0791	0.1046

### 6.4 General Observations

There are some subtle differences between the standard and airbag restraints with respect to the injury criteria. The airbag restraints do decrease some of the specific body injury probabilities. However, most of the calculated injury probabilities calculated for both the HB50 and LARD manikins are within acceptable limits.

It is believed that the specific failure modes of the H-60A/L seat identified within the test program, along with the mitigation strategies, are of more importance. The failure modes appear to line up with injury patterns seen within the injury mishap data. It is believed that mitigating these failure modes will save one fatality and one major injury per year.

It is recognized that failure modes seen in a laboratory environment may or may not correlate well with actual failures seen in operational mishaps. Further study is needed to determine the correlation.



## 7.0 CONCLUSIONS

Testing was completed to determine the injury probability effects of adding an airbag restraint to an H-60A/L troop seat over a standard 4-point restraint. Due to structural failure modes of the H-60A/L seat as well as failures of the restraint, comparison was not possible without modifications to the seat. Fixes to the seat included: ensuring the top seat mount points stayed engaged, an additional layer of seat pan fabric to prevent the occupant going through the seat pan during an impact, and the addition of a 'crotch strap' to prevent submarining of an occupant during an impact. No mitigation strategies were used to prevent the feet of the seat from disengaging from the fixture. The submarining of the manikin was not as apparent with the rigid seat, suggesting that the combination of the restraint and dipping of the H-60A/L seat pan during impact are the cause of the submarining. With the fixes to the seat, it was shown that the airbag restraint does positively affect the injury potential to the occupant during an impact. This improvement was primarily to reduced torso belt loading, which may prevent or reduce vascular injury to the chest in some orientations. Also, reduction of arm flail was shown primarily in the PH orientation, which hints at the restraint being useful in preventing or reducing other impact injuries to the occupant. Changes to the neck injury probability were also seen with the airbag restraint.

The failure modes seen in the seat structure, as well as the submarining of an occupant due to the restraint and the dipping of the seat pan, seem to correlate well with the modes of injury seen in operational mishap data (Mapes 2008). By keeping an occupant's pelvis tightly secured during an impact, reduction of flail and impact injuries, as well as injuries to the chest and spine, may be reduced. Seat failure and submarining mitigation strategies developed during AFRL testing should be considered for operational use. In addition failure modes of the seats contributing to major or fatal injuries should be further studied to determine the effects of modifying operational seats.

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## 9.0 ACRONYM

711HPW	711 <sup>th</sup> Human Performance Wing
ACH	Advanced Combat Helmet
AFRL	Air Force Research Laboratory
AIS	Abbreviated Injury Scale
CH	Combined Horizontal
CRADA	Cooperative Research & Development Agreement
CV	Combined Vertical
DAS	Data Acquisition System
DTS	Diversified Technical Systems
DOT&E	Office of the Director, Operational Test & Evaluation
DRMO	Defense Reutilization and Marketing Offices
DRZ	Dynamic Response Index Z
DSOC	Defense Safety Oversight Council
FSC	Full Spectrum Crashworthiness
HB50	Hybrid III 50 <sup>th</sup> percentile manikin
HIA	Horizontal Impulse Accelerator
HIC	Head Injury Criterion
IST	Infoscitex Corporation
JSF	Joint Strike Fighter
LARD	Large Anthropomorphic Research Device
LOIS	Lightest Occupant In Service
MOA	Memorandum of Agreement
NIC	Neck Injury Criteria
OSD	Office of the Secretary of Defense
PV	Pure Vertical
RHCP	Applied Neuroscience Branch
SBIR	Small Business Innovative Research
UNMI <sub>x</sub>	Upper Neck Moment Index X
UNMI <sub>z</sub>	Upper Neck Moment Index Z
VDT	Vertical Deceleration Tower

# 10.0 APPENDIX A. INJURY CRITERIA RESULTS

Test #	Cell	Orientation	Seat	Restraint	Manikin	Acceleration (G)	Velocity (fps)	Rise Time (ms)	Duration (ms)	Bottom Neck Displacement (in.)	Torso Belt Peak Force (lb)	Chest Resultant G	Peak Lumbar Comp	Peak Lumbar Tension	Nf	Nte	Ncf	Nce	UNMIx	UNMIz
HIA8613	A	PH	RIGID	STD	HB50	17.38	46.43	83	125	4.76	1413	29	1139	155	0.4000	0.3806	0.0655	0.4041	0.0872	0.0299
HIA8614	A	PH	RIGID	STD	HB50	17.41	46.6	82	125	4.03	1619	28	1258	140	0.4349	0.4005	0.0642	0.2941	0.0578	0.0193
HIA8615	A	PH	RIGID	STD	HB50	17.76	46.74	71	123	3.67	1616	27	974	485	0.4257	0.3274	0.0513	0.2102	0.1318	0.0380
HIA8616	B	PH	RIGID	STD	HB50	24.79	53.64	67	104	5.84	1988	43	1632	317	0.5866	0.4341	0.0668	0.4347	0.1298	0.0572
HIA8617	B	PH	RIGID	STD	HB50	24.85	53.76	68	104	5.22	2206	41	1860	356	0.6068	0.3744	0.0752	0.2673	0.0694	0.0565
HIA8618	B	PH	RIGID	STD	HB50	24.65	53.48	69	105	5.65	2007	42	1941	326	0.5873	0.3646	0.0663	0.2934	0.1053	0.0443
HIA8619	B	PH	RIGID	STD	HB50	23.92	52.93	67	106	5.42	2005	40	1744	504	0.6167	0.3199	0.0518	0.2353	0.1285	0.0312
HIA8621	C	PH	H-60	STD	HB50	17.89	46.1	74	122		1827	29	222	619	0.6923	0.4135	0.2941	0.0719	0.1102	0.0825
HIA8622	D	PH	H-60	AIRBAG	HB50	17.9	46.39	74	123		1535	25	15.2	1331	0.7436	0.3407	0.0602	0.0166	0.1195	0.0710
HIA8623	E	PH	H-60	STD	VIP95	25.17	53.15	63	102											
HIA8704	U	PH	H-60MOD	STD W/CROTCH	HB50	18.01	46.73	72	123		2025	31	312	603	0.7379	0.1765	0.2267	0.3551	0.0891	0.0320
HIA8705	U	PH	H60-MOD2	STD W/CROTCH	HB50	18.2	46.53	72	123		2060	24	194	325	0.4435	0.2370	0.1344	0.0990	0.0781	0.0368
HIA8706	V	PH	H60-MOD2	AIRBAG W/CROTCH	HB50	18.01	46.4	72	123		1513	22	307	318	0.4255	0.2921	0.0803	0.1513	0.1262	0.0414
HIA8707	F	PH	H60-MOD2	STD W/CROTCH	LARD	24.79	53.07	66	102		2254	55	82.3	494	0.9021	0.2901	0.9125	0.1861	0.2271	0.1407
HIA8711	S	PH	RIGID	AIRBAG	HB50	17.54	46.52	72	126	3.89	1282	26	1148	111	0.3963	0.3186	0.2610	0.2007	0.1509	0.0413
HIA8712	T	PH	RIGID	AIRBAG	HB50	23.81	52.89	66	104	5.43	1788	40	1580	135	0.5944	0.4097	0.3052	0.3632	0.0610	0.0503
VDT6276	H	PV	H-60	STD	HB50	15.5	31.04	35.5	121.6		173	22	1206	97.6	0.0700	0.0000	0.2545	0.1900	0.0758	0.0356
VDT6277	H	PV	H-60	STD	HB50	15.57	31.43	35.2	120.8		154	22	1235	127	0.0871	0.0000	0.2851	0.1528	0.0424	0.0298
VDT6278	J	PV	H-60	STD	HB50	34.19	48.63	24.8	87.5		160	43	1353	137	0.4368	0.2027	0.4717	0.1976	0.1323	0.0433
VDT6279	K	PV	H-60	AIRBAG	HB50	30.64	48.61	28.7	88.8		204	37	1231	219	0.3610	0.2765	0.3391	0.0497	0.1622	0.0661
VDT6280	J	PV	H-60	STD	HB50	30.18	48.65	28.2	90.9		384	23	1185	392	0.3111	0.1581	0.3197	0.2242	0.2154	0.0532
VDT6281	L	PV	H-60MOD	AIRBAG W/CROTCH	HB50	31.59	48.6	27.6	91.3		331	29	1431	138	0.0703	0.2316	0.2602	0.1962	0.1076	0.0573
VDT6282	M	PV	H-60MOD	STD W/CROTCH	HB50	30.17	48.61	24.8	89.7		185	28	1132	140	0.2004	0.0829	0.3674	0.3379	0.1199	0.0199
VDT6283	N	PV	H-60MOD	STD W/CROTCH	LARD	33.31	48.95	23.5	87.4		110	35	1763	225	0.1737	0.1464	0.3624	0.2258	0.0875	0.0451
VDT6284	Q	CV	H-60MOD	STD W/CROTCH	LARD	28.56	49.06	24.4	87.5		1562	36	1579	478	0.5855	0.1412	0.0311	0.2368	0.1603	0.0791
VDT6285	R	CV	H-60MOD	AIRBAG W/CROTCH	LARD	32.2	49.06	25.2	86.9		1270	36	1188	411	1.2458	0.3083	0.0894	0.0693	0.1006	0.1046
VDT6286	P	CV	H-60MOD	AIRBAG W/CROTCH	LARD	23.23	40.56	28	94.4		1009	21	1441	177	0.3208	0.2048	0.2032	0.0887	0.0555	0.0823
VDT6287	O	CV	H-60MOD	STD W/CROTCH	LARD	21.39	40.56	31.6	99		1267	21	1373	238	Bad My Channel					

## 11.0 APPENDIX B – HIA DATA

201204 Test: 8613 Test Date: 121017 Subj: HB50 Wt: 165.0  
Nom G: 18.0 Cell: A

Data ID	Immediate Preimpact	Maximum Value	Minimum Value	Time Of Maximum	Time Of Minimum
Reference Mark Time (Ms)				-146.0	
Impact Rise Time (Ms)				83.0	
Impact Duration (Ms)				125.0	
Velocity Change (Ft/Sec)		46.43			
SLED X ACCEL (G)	0.00	17.38	-0.75	83.0	159.0
SLED Y ACCEL (G)	0.00	0.88	-1.00	48.0	10.0
SLED Z ACCEL (G)	1.00	3.90	-3.69	27.0	22.0
SLED VELOCITY (FT/SEC)	0.19	43.85	0.19	300.0	0.0
INTEGRATED ACCEL (FT/SEC)	0.03	46.43	0.04	124.0	0.0
SEAT FIXTURE X ACCEL (G)	-0.01	21.23	-3.65	78.0	137.0
SEAT FIXTURE Y ACCEL (G)	0.00	4.14	-3.94	32.0	26.0
SEAT FIXTURE Z ACCEL (G)	1.00	7.00	-5.19	29.0	22.0
SEAT FIXTURE DRX	-0.02	23.97	-11.08	71.0	154.0
SEAT PAN X ACCEL (G)	0.00	3.76	-4.17	30.0	24.0
SEAT PAN Y ACCEL (G)	0.00	5.25	-2.84	20.0	138.0
SEAT PAN Z ACCEL (G)	0.99	22.59	-2.38	79.0	138.0
SEAT PAN DRX	0.01	0.28	-0.21	100.0	159.0
TOP LEFT FRONT SEAT X (LB)	-19.10	564.71	-154.68	68.0	204.0
TOP LEFT FRONT SEAT Y (LB)	-12.22	84.51	-53.07	202.0	138.0
TOP LEFT FRONT SEAT Z (LB)	-35.96	822.74	-230.81	73.0	139.0
TOP LEFT FRONT SEAT RES (LB)	42.63	991.57	26.92	73.0	8.0
TOP RIGHT FRONT SEAT X (LB)	-28.24	521.62	-99.90	76.0	203.0
TOP RIGHT FRONT SEAT Y (LB)	-35.91	41.37	-113.60	59.0	239.0
TOP RIGHT FRONT SEAT Z (LB)	-36.21	560.05	-232.89	67.0	128.0
TOP RIGHT FRONT SEAT RES (LB)	58.37	764.94	40.31	67.0	7.0
BOT LEFT FRONT SEAT X (LB)	36.46	554.79	-47.93	79.0	302.0
BOT LEFT FRONT SEAT Y (LB)	25.66	277.97	-34.00	76.0	15.0
BOT LEFT FRONT SEAT Z (LB)	21.16	267.56	-1420.76	210.0	75.0
BOT LEFT FRONT SEAT RES (LB)	49.43	1526.98	47.13	75.0	186.0
BOT RIGHT FRONT SEAT X (LB)	-24.20	422.26	-37.78	100.0	208.0
BOT RIGHT FRONT SEAT Y (LB)	20.21	73.68	-309.07	182.0	71.0
BOT RIGHT FRONT SEAT Z (LB)	30.20	223.89	-1593.28	198.0	71.0
BOT RIGHT FRONT SEAT RES (LB)	43.72	1666.58	8.03	72.0	139.0
BOT LEFT REAR SEAT X (LB)	26.21	179.15	-71.66	143.0	64.0
BOT LEFT REAR SEAT Y (LB)	-24.80	-17.80	-30.99	56.0	337.0

BOT LEFT REAR SEAT Z (LB)	35.71	845.92	-5.59	65.0	152.0
BOT LEFT REAR SEAT RES (LB)	50.84	849.21	45.75	65.0	5.0
BOT RIGHT REAR SEAT X (LB)	-27.22	1783.29	-195.70	75.0	203.0
BOT RIGHT REAR SEAT Y (LB)	24.84	142.60	-135.37	20.0	136.0
BOT RIGHT REAR SEAT Z (LB)	43.61	592.77	-122.75	68.0	177.0
BOT RIGHT REAR SEAT RES (LB)	57.15	1843.92	34.52	75.0	309.0
LEFT SHOULDER FORCE (LB)	9.45	717.16	-1.56	70.0	189.0
RIGHT SHOULDER FORCE (LB)	16.12	696.03	0.60	70.0	185.0
LEFT LAP FORCE (LB)	11.58	710.10	0.48	71.0	267.0
RIGHT LAP FORCE (LB)	14.64	684.33	4.34	71.0	267.0
INT HEAD X ACCEL (G)	-0.01	28.76	-17.49	246.0	68.0
INT HEAD Y ACCEL (G)	0.00	15.59	-16.21	242.0	228.0
INT HEAD Z ACCEL (G)	0.99	1.39	-21.00	395.0	97.0
INT HEAD RESULTANT (G)	0.99	29.58	0.61	246.0	15.0
INT HEAD HIC		45.63		94.0	109.0
INT HEAD Ry ANG ACC (RAD/S2)	-0.52	4153.19	-1145.18	246.0	95.0
INT NECK X FORCE (LB)	3.96	66.17	-204.42	208.0	105.0
INT NECK Y FORCE (LB)	-6.27	11.81	-39.54	92.0	228.0
INT NECK Z FORCE (LB)	-11.59	291.91	-53.91	100.0	241.0
INT NECK FORCE RES (LB)	13.76	347.39	8.83	101.0	16.0
INT NECK Mx TORQUE (IN-LB)	8.35	104.16	-93.28	248.0	122.0
INT NECK My TORQUE (IN-LB)	-7.83	530.65	-434.56	88.0	244.0
INT NECK Mz TORQUE (IN-LB)	-6.96	35.67	-22.62	118.0	241.0
LOWER NECK DISPLACEMENT (IN)	0.00	0.05	-4.76	191.0	112.0
INT NECK TORQUE RES (IN-LB)	13.41	532.20	4.66	88.0	174.0
INT CHEST X ACCEL (G)	-0.01	10.67	-27.44	199.0	67.0
INT CHEST Y ACCEL (G)	0.01	1.80	-4.47	202.0	85.0
INT CHEST Z ACCEL (G)	1.00	10.28	-9.04	74.0	94.0
INT CHEST RESULTANT (G)	1.00	28.64	0.54	69.0	218.0
INT CHEST Ry ANG ACC (RAD/S2)	0.30	812.87	-785.70	216.0	212.0
INT LUMBAR X ACCEL (G)	-0.02	4.84	-42.14	224.0	69.0
INT LUMBAR Y ACCEL (G)	-0.01	3.09	-3.03	124.0	129.0
INT LUMBAR Z ACCEL (G)	1.01	19.84	-2.44	64.0	227.0
INT LUMBAR RESULTANT (G)	1.01	45.41	0.52	70.0	335.0
INT LUMBAR X FORCE (LB)	11.27	357.13	-115.86	121.0	212.0
INT LUMBAR Y FORCE (LB)	-6.07	68.77	-43.63	85.0	126.0
INT LUMBAR Z FORCE (LB)	-15.32	155.27	-1138.58	96.0	76.0
INT LUMBAR FORCE RES (LB)	19.98	1145.83	2.15	76.0	265.0
INT LUMBAR Mx TORQUE (IN-LB)	-37.69	368.27	-236.90	84.0	126.0
INT LUMBAR My TORQUE (IN-LB)	21.00	843.17	-1124.86	209.0	121.0
INT LUMBAR Mz TORQUE (IN-LB)	21.01	113.42	-47.47	288.0	81.0

INT LUMBAR TORQUE RES (IN-LB)	47.99	1143.36	17.91	121.0	61.0
NIJ SHEAR (LB)		66.17	-204.42	208.0	105.0
NIJ TENSION (LB)		291.91		100.0	
NIJ COMPRESSION (LB)		-53.91		241.0	
NIJ FLEXION (IN-LB)		643.97		88.0	
NIJ EXTENSION (IN-LB)		458.94		244.0	
NIJ NTF	0.0000	0.3996	0.0000	96.0	0.0
NIJ NTE	0.0000	0.3806	0.0000	245.0	0.0
NIJ NCF	0.0000	0.0655	0.0000	395.0	0.0
NIJ NCE	0.0172	0.4041	0.0000	243.0	27.0
NIJ NTF AIS >= 2		0.17			
NIJ NTF AIS >= 3		0.08			
NIJ NTF AIS >= 4		0.10			
NIJ NTF AIS >= 5		0.03			
NIJ NTE AIS >= 2		0.17			
NIJ NTE AIS >= 3		0.08			
NIJ NTE AIS >= 4		0.10			
NIJ NTE AIS >= 5		0.03			
NIJ NCF AIS >= 2		0.12			
NIJ NCF AIS >= 3		0.04			
NIJ NCF AIS >= 4		0.07			
NIJ NCF AIS >= 5		0.02			
NIJ NCE AIS >= 2		0.17			
NIJ NCE AIS >= 3		0.08			
NIJ NCE AIS >= 4		0.10			
NIJ NCE AIS >= 5		0.03			
MNIx	0.0070	0.0872	0.0000	248.0	424.0
NMIz	0.0058	0.0299	0.0000	118.0	183.0



201204 Test: 8614 Test Date: 121017 Subj: HB50 Wt: 165.0  
 Nom G: 18.0 Cell: A

Data ID	Immediate Preimpact	Maximum Value	Minimum Value	Time Of Maximum	Time Of Minimum
Reference Mark Time (Ms)				-142.0	
Impact Rise Time (Ms)				82.0	
Impact Duration (Ms)				125.0	
Velocity Change (Ft/Sec)		46.60			
SLED X ACCEL (G)	0.00	17.41	-0.74	82.0	158.0
SLED Y ACCEL (G)	0.00	1.04	-1.19	48.0	53.0
SLED Z ACCEL (G)	1.00	3.99	-3.30	27.0	22.0
SLED VELOCITY (FT/SEC)	0.19	44.57	0.20	189.0	2.0
INTEGRATED ACCEL (FT/SEC)	0.04	46.60	0.06	125.0	0.0
SEAT FIXTURE X ACCEL (G)	0.00	2.74	-21.18	162.0	78.0
SEAT FIXTURE Y ACCEL (G)	0.00	6.73	-6.31	20.0	64.0
SEAT FIXTURE Z ACCEL (G)	0.99	6.43	-5.07	29.0	22.0
SEAT FIXTURE DRX	0.02	10.92	-24.09	154.0	71.0
SEAT PAN X ACCEL (G)	0.01	2.60	-20.61	179.0	78.0
SEAT PAN Y ACCEL (G)	0.00	5.70	-3.24	59.0	53.0
SEAT PAN Z ACCEL (G)	1.01	5.83	-2.86	23.0	29.0
SEAT PAN DRX	0.03	10.67	-23.23	154.0	72.0
TOP LEFT FRONT SEAT X (LB)	-1.97	626.63	-121.99	60.0	227.0
TOP LEFT FRONT SEAT Y (LB)	-21.11	58.30	-87.13	58.0	150.0
TOP LEFT FRONT SEAT Z (LB)	-42.33	864.90	-155.73	72.0	150.0
TOP LEFT FRONT SEAT RES (LB)	47.43	1057.96	11.51	72.0	159.0
TOP RIGHT FRONT SEAT X (LB)	-38.86	511.56	-139.46	74.0	227.0
TOP RIGHT FRONT SEAT Y (LB)	-36.97	61.72	-106.37	59.0	196.0
TOP RIGHT FRONT SEAT Z (LB)	-33.60	591.48	-185.45	65.0	229.0
TOP RIGHT FRONT SEAT RES (LB)	63.34	773.84	47.15	65.0	7.0
BOT LEFT FRONT SEAT X (LB)	25.47	746.34	-5.91	92.0	181.0
BOT LEFT FRONT SEAT Y (LB)	41.05	280.65	-7.33	74.0	19.0
BOT LEFT FRONT SEAT Z (LB)	-4.51	186.48	-1478.76	196.0	74.0
BOT LEFT FRONT SEAT RES (LB)	49.16	1579.99	33.18	74.0	237.0
BOT RIGHT FRONT SEAT X (LB)	-24.91	691.42	-43.75	90.0	201.0
BOT RIGHT FRONT SEAT Y (LB)	34.71	104.32	-286.24	146.0	78.0
BOT RIGHT FRONT SEAT Z (LB)	73.85	291.49	-1559.17	195.0	77.0
BOT RIGHT FRONT SEAT RES (LB)	85.35	1619.29	22.96	77.0	9.0
BOT LEFT REAR SEAT X (LB)	20.72	125.73	-136.16	142.0	64.0
BOT LEFT REAR SEAT Y (LB)	-26.00	-17.80	-30.99	318.0	271.0
BOT LEFT REAR SEAT Z (LB)	16.54	797.93	-90.59	64.0	150.0
BOT LEFT REAR SEAT RES (LB)	37.25	809.83	26.58	64.0	207.0

BOT RIGHT REAR SEAT X (LB)	-40.24	1783.90	-234.11	74.0	193.0
BOT RIGHT REAR SEAT Y (LB)	14.74	229.35	-115.00	20.0	120.0
BOT RIGHT REAR SEAT Z (LB)	44.46	605.68	-162.83	67.0	230.0
BOT RIGHT REAR SEAT RES (LB)	61.85	1829.36	35.13	74.0	337.0
LEFT SHOULDER FORCE (LB)	16.01	856.25	-1.79	69.0	191.0
RIGHT SHOULDER FORCE (LB)	14.45	763.91	-0.60	68.0	181.0
LEFT LAP FORCE (LB)	13.08	685.25	8.03	71.0	314.0
RIGHT LAP FORCE (LB)	13.11	709.89	12.49	70.0	295.0
INT HEAD X ACCEL (G)	0.00	29.54	-17.69	228.0	72.0
INT HEAD Y ACCEL (G)	0.00	3.96	-2.82	226.0	234.0
INT HEAD Z ACCEL (G)	1.00	1.23	-19.33	369.0	92.0
INT HEAD RESULTANT (G)	1.00	32.99	0.19	228.0	253.0
INT HEAD HIC		45.36		220.0	233.0
INT HEAD Ry ANG ACC (RAD/S2)	-0.23	2527.50	-1315.86	231.0	94.0
INT NECK X FORCE (LB)	4.91	57.07	-201.65	202.0	71.0
INT NECK Y FORCE (LB)	-5.00	9.25	-12.12	227.0	110.0
INT NECK Z FORCE (LB)	-7.40	274.12	-20.02	92.0	238.0
INT NECK FORCE RES (LB)	10.21	332.54	5.24	91.0	15.0
INT NECK Mx TORQUE (IN-LB)	6.03	69.09	-63.25	90.0	117.0
INT NECK My TORQUE (IN-LB)	-6.37	588.47	-478.15	94.0	230.0
INT NECK Mz TORQUE (IN-LB)	-5.95	23.11	-12.76	69.0	355.0
LOWER NECK DISPLACEMENT (IN)	0.00	4.03	-0.01	110.0	183.0
INT NECK TORQUE RES (IN-LB)	10.61	591.30	5.60	94.0	312.0
INT CHEST X ACCEL (G)	0.00	8.33	-27.05	193.0	66.0
INT CHEST Y ACCEL (G)	0.00	1.47	-5.41	192.0	81.0
INT CHEST Z ACCEL (G)	0.99	13.41	-9.48	78.0	93.0
INT CHEST RESULTANT (G)	0.99	28.48	0.06	66.0	247.0
INT CHEST Ry ANG ACC (RAD/S2)	-0.12	647.89	-433.56	71.0	242.0
INT LUMBAR X ACCEL (G)	0.01	3.03	-40.75	228.0	71.0
INT LUMBAR Y ACCEL (G)	-0.01	2.80	-2.52	58.0	113.0
INT LUMBAR Z ACCEL (G)	1.01	22.45	-1.66	61.0	45.0
INT LUMBAR RESULTANT (G)	1.01	44.86	0.61	71.0	188.0
INT LUMBAR X FORCE (LB)	7.77	307.32	-50.69	113.0	226.0
INT LUMBAR Y FORCE (LB)	-6.56	103.71	-11.00	83.0	112.0
INT LUMBAR Z FORCE (LB)	-9.07	140.25	-1258.25	93.0	74.0
INT LUMBAR FORCE RES (LB)	13.65	1269.49	10.83	74.0	298.0
INT LUMBAR Mx TORQUE (IN-LB)	-11.97	533.16	-47.33	81.0	112.0
INT LUMBAR My TORQUE (IN-LB)	-0.34	533.77	-1325.47	204.0	77.0
INT LUMBAR Mz TORQUE (IN-LB)	-72.56	0.00	-111.13	327.0	76.0
INT LUMBAR TORQUE RES (IN-LB)	73.54	1414.37	16.10	78.0	337.0

NIJ SHEAR (LB)		57.07	-201.65	202.0	71.0
NIJ TENSION (LB)		274.12		92.0	
NIJ COMPRESSION (LB)		-20.02		238.0	
NIJ FLEXION (IN-LB)		717.35		94.0	
NIJ EXTENSION (IN-LB)		451.71		231.0	
NIJ NTF	0.0000	0.4349	0.0000	92.0	0.0
NIJ NTE	0.0000	0.4005	0.0000	231.0	0.0
NIJ NCF	0.0000	0.0642	0.0000	373.0	0.0
NIJ NCE	0.0135	0.2941	0.0000	236.0	24.0
NIJ NTF AIS >= 2		0.18			
NIJ NTF AIS >= 3		0.09			
NIJ NTF AIS >= 4		0.10			
NIJ NTF AIS >= 5		0.04			
NIJ NTE AIS >= 2		0.17			
NIJ NTE AIS >= 3		0.08			
NIJ NTE AIS >= 4		0.10			
NIJ NTE AIS >= 5		0.03			
NIJ NCF AIS >= 2		0.12			
NIJ NCF AIS >= 3		0.04			
NIJ NCF AIS >= 4		0.07			
NIJ NCF AIS >= 5		0.02			
NIJ NCE AIS >= 2		0.15			
NIJ NCE AIS >= 3		0.07			
NIJ NCE AIS >= 4		0.09			
NIJ NCE AIS >= 5		0.03			
MNIx	0.0050	0.0578	0.0001	90.0	39.0
NMIz	0.0050	0.0193	0.0000	69.0	405.0

201204 Test: 8615 Test Date: 121018 Subj: HB50 Wt: 165.0  
 Nom G: 18.0 Cell: A

Data ID	Immediate Preimpact	Maximum Value	Minimum Value	Time Of Maximum	Time Of Minimum
Reference Mark Time (Ms)				-154.0	
Impact Rise Time (Ms)				71.0	
Impact Duration (Ms)				123.0	
Velocity Change (Ft/Sec)		46.74			
SLED X ACCEL (G)	0.01	17.76	-0.66	71.0	126.0
SLED Y ACCEL (G)	0.00	0.80	-1.27	46.0	53.0
SLED Z ACCEL (G)	1.00	4.15	-1.73	26.0	31.0
SLED VELOCITY (FT/SEC)	0.18	44.66	0.18	228.0	0.0
INTEGRATED ACCEL (FT/SEC)	0.01	46.74	0.03	123.0	0.0
SEAT FIXTURE X ACCEL (G)	-0.02	3.77	-22.54	134.0	41.0
SEAT FIXTURE Y ACCEL (G)	0.00	8.78	-6.40	23.0	28.0
SEAT FIXTURE Z ACCEL (G)	0.98	6.90	-3.84	18.0	23.0
SEAT FIXTURE DRX	0.00	11.18	-25.09	152.0	71.0
SEAT PAN X ACCEL (G)	-0.01	3.38	-21.72	135.0	41.0
SEAT PAN Y ACCEL (G)	-0.01	5.30	-3.36	24.0	202.0
SEAT PAN Z ACCEL (G)	1.00	4.33	-2.68	87.0	30.0
SEAT PAN DRX	0.02	10.94	-24.18	152.0	71.0
TOP LEFT FRONT SEAT X (LB)	-16.54	585.28	-107.99	77.0	178.0
TOP LEFT FRONT SEAT Y (LB)	-6.65	110.05	-62.23	207.0	133.0
TOP LEFT FRONT SEAT Z (LB)	-38.72	771.73	-174.32	71.0	281.0
TOP LEFT FRONT SEAT RES (LB)	42.68	961.24	15.72	71.0	342.0
TOP RIGHT FRONT SEAT X (LB)	-25.14	545.73	-219.23	74.0	198.0
TOP RIGHT FRONT SEAT Y (LB)	-35.10	81.41	-197.62	69.0	199.0
TOP RIGHT FRONT SEAT Z (LB)	-44.29	539.69	-215.63	79.0	177.0
TOP RIGHT FRONT SEAT RES (LB)	61.92	740.87	27.35	78.0	243.0
BOT LEFT FRONT SEAT X (LB)	25.80	884.15	-40.70	84.0	191.0
BOT LEFT FRONT SEAT Y (LB)	51.30	243.28	-39.33	74.0	32.0
BOT LEFT FRONT SEAT Z (LB)	0.43	314.32	-1289.10	201.0	75.0
BOT LEFT FRONT SEAT RES (LB)	57.48	1415.01	60.48	75.0	1.0
BOT RIGHT FRONT SEAT X (LB)	-21.16	774.91	-58.33	87.0	184.0
BOT RIGHT FRONT SEAT Y (LB)	18.56	74.98	-345.55	180.0	78.0
BOT RIGHT FRONT SEAT Z (LB)	8.40	243.08	-1722.06	180.0	77.0
BOT RIGHT FRONT SEAT RES (LB)	29.54	1798.99	16.91	77.0	168.0
BOT LEFT REAR SEAT X (LB)	23.60	147.88	-133.55	139.0	63.0
BOT LEFT REAR SEAT Y (LB)	-23.76	-15.82	-29.67	390.0	196.0
BOT LEFT REAR SEAT Z (LB)	20.02	755.77	-65.77	72.0	234.0
BOT LEFT REAR SEAT RES (LB)	39.11	762.85	25.48	72.0	184.0

BOT RIGHT REAR SEAT X (LB)	-26.75	1716.15	-199.35	74.0	185.0
BOT RIGHT REAR SEAT Y (LB)	23.23	358.80	-155.74	22.0	132.0
BOT RIGHT REAR SEAT Z (LB)	13.59	622.97	-234.39	80.0	255.0
BOT RIGHT REAR SEAT RES (LB)	38.04	1767.29	18.42	75.0	426.0
LEFT SHOULDER FORCE (LB)	20.69	783.98	-1.68	69.0	180.0
RIGHT SHOULDER FORCE (LB)	21.87	833.94	-0.18	71.0	180.0
LEFT LAP FORCE (LB)	16.21	791.49	16.17	77.0	4.0
RIGHT LAP FORCE (LB)	14.17	762.83	14.03	76.0	2.0
INT HEAD X ACCEL (G)	-0.01	38.99	-22.34	198.0	98.0
INT HEAD Y ACCEL (G)	0.00	32.51	-16.60	199.0	212.0
INT HEAD Z ACCEL (G)	1.00	1.49	-20.70	340.0	58.0
INT HEAD RESULTANT (G)	1.00	52.66	0.22	199.0	292.0
INT HEAD HIC		65.78		196.0	201.0
INT HEAD Ry ANG ACC (RAD/S2)	0.11	2952.86	-1703.89	199.0	84.0
INT NECK X FORCE (LB)	2.41	64.68	-257.82	185.0	98.0
INT NECK Y FORCE (LB)	-3.68	48.11	-17.95	199.0	79.0
INT NECK Z FORCE (LB)	-10.74	284.10	-26.90	69.0	220.0
INT NECK FORCE RES (LB)	11.61	348.90	4.61	69.0	295.0
INT NECK Mx TORQUE (IN-LB)	8.23	157.54	-71.64	211.0	72.0
INT NECK My TORQUE (IN-LB)	-2.45	635.46	-334.89	84.0	210.0
INT NECK Mz TORQUE (IN-LB)	-4.62	45.35	-29.59	212.0	74.0
LOWER NECK DISPLACEMENT (IN)	0.00	3.67	-0.13	109.0	380.0
INT NECK TORQUE RES (IN-LB)	9.76	635.91	7.72	84.0	190.0
INT CHEST X ACCEL (G)	0.00	11.91	-25.92	178.0	68.0
INT CHEST Y ACCEL (G)	0.00	4.19	-5.82	83.0	89.0
INT CHEST Z ACCEL (G)	0.99	17.47	-5.42	94.0	53.0
INT CHEST RESULTANT (G)	0.99	27.13	0.22	69.0	241.0
INT CHEST Ry ANG ACC (RAD/S2)	-0.44	946.52	-303.93	175.0	190.0
INT LUMBAR X ACCEL (G)	-0.01	3.98	-46.02	226.0	86.0
INT LUMBAR Y ACCEL (G)	0.00	2.44	-4.00	49.0	95.0
INT LUMBAR Z ACCEL (G)	1.00	40.11	-4.10	91.0	180.0
INT LUMBAR RESULTANT (G)	1.00	59.29	0.60	86.0	25.0
INT LUMBAR X FORCE (LB)	2.56	540.80	-74.95	99.0	87.0
INT LUMBAR Y FORCE (LB)	-6.23	-0.12	-137.66	192.0	75.0
INT LUMBAR Z FORCE (LB)	-23.69	485.05	-974.30	85.0	73.0
INT LUMBAR FORCE RES (LB)	24.64	1013.52	21.39	73.0	9.0
INT LUMBAR Mx TORQUE (IN-LB)	57.45	60.38	-796.45	20.0	76.0
INT LUMBAR My TORQUE (IN-LB)	46.66	1236.12	-1426.50	87.0	99.0
INT LUMBAR Mz TORQUE (IN-LB)	4.21	181.85	3.32	73.0	16.0
INT LUMBAR TORQUE RES (IN-LB)	74.13	1458.83	29.22	99.0	28.0

NIJ SHEAR (LB)		64.68	-257.82	185.0	98.0
NIJ TENSION (LB)		284.10		69.0	
NIJ COMPRESSION (LB)		-26.90		220.0	
NIJ FLEXION (IN-LB)		736.30		83.0	
NIJ EXTENSION (IN-LB)		299.95		210.0	
NIJ NTF	0.0000	0.4257	0.0000	85.0	0.0
NIJ NTE	0.0000	0.3274	0.0000	202.0	0.0
NIJ NCF	0.0000	0.0513	0.0000	338.0	0.0
NIJ NCE	0.0112	0.2102	0.0000	220.0	21.0
NIJ NTF AIS >= 2		0.18			
NIJ NTF AIS >= 3		0.08			
NIJ NTF AIS >= 4		0.10			
NIJ NTF AIS >= 5		0.04			
NIJ NTE AIS >= 2		0.16			
NIJ NTE AIS >= 3		0.07			
NIJ NTE AIS >= 4		0.09			
NIJ NTE AIS >= 5		0.03			
NIJ NCF AIS >= 2		0.12			
NIJ NCF AIS >= 3		0.04			
NIJ NCF AIS >= 4		0.07			
NIJ NCF AIS >= 5		0.02			
NIJ NCE AIS >= 2		0.14			
NIJ NCE AIS >= 3		0.06			
NIJ NCE AIS >= 4		0.08			
NIJ NCE AIS >= 5		0.03			
MNIx	0.0069	0.1318	0.0001	211.0	269.0
NMIz	0.0039	0.0380	0.0000	212.0	183.0

201204 Test: 8616 Test Date: 121018 Subj: HB50 Wt: 165.0  
 Nom G: 24.0 Cell: B

Data ID	Immediate Preimpact	Maximum Value	Minimum Value	Time Of Maximum	Time Of Minimum
Reference Mark Time (Ms)				-218.0	
Impact Rise Time (Ms)				67.0	
Impact Duration (Ms)				104.0	
Velocity Change (Ft/Sec)		53.64			
SLED X ACCEL (G)	0.00	24.79	-0.58	67.0	112.0
SLED Y ACCEL (G)	0.00	1.02	-1.25	16.0	11.0
SLED Z ACCEL (G)	1.00	5.68	-5.19	25.0	20.0
SLED VELOCITY (FT/SEC)	0.17	51.63	0.15	261.0	2.0
INTEGRATED ACCEL (FT/SEC)	0.05	53.64	0.07	104.0	0.0
SEAT FIXTURE X ACCEL (G)	0.00	3.45	-30.25	113.0	57.0
SEAT FIXTURE Y ACCEL (G)	0.00	7.37	-5.18	19.0	24.0
SEAT FIXTURE Z ACCEL (G)	1.01	10.85	-8.04	27.0	20.0
SEAT FIXTURE DRX	-0.04	27.79	-37.56	134.0	71.0
SEAT PAN X ACCEL (G)	0.01	3.18	-29.28	113.0	73.0
SEAT PAN Y ACCEL (G)	0.00	5.82	-4.09	21.0	127.0
SEAT PAN Z ACCEL (G)	1.00	6.83	-5.72	21.0	27.0
SEAT PAN DRX	-0.02	26.99	-36.29	134.0	71.0
TOP LEFT FRONT SEAT X (LB)	-20.02	853.25	-182.65	57.0	214.0
TOP LEFT FRONT SEAT Y (LB)	-7.06	81.23	-82.54	187.0	127.0
TOP LEFT FRONT SEAT Z (LB)	-37.94	1261.92	-174.96	59.0	117.0
TOP LEFT FRONT SEAT RES (LB)	43.55	1517.01	15.59	59.0	229.0
TOP RIGHT FRONT SEAT X (LB)	-25.94	823.29	-166.94	58.0	215.0
TOP RIGHT FRONT SEAT Y (LB)	-35.08	53.84	-122.13	30.0	198.0
TOP RIGHT FRONT SEAT Z (LB)	-42.06	898.80	-240.87	58.0	186.0
TOP RIGHT FRONT SEAT RES (LB)	60.65	1218.88	43.92	58.0	7.0
BOT LEFT FRONT SEAT X (LB)	26.46	1138.17	-43.32	73.0	219.0
BOT LEFT FRONT SEAT Y (LB)	31.35	384.59	-36.66	58.0	183.0
BOT LEFT FRONT SEAT Z (LB)	-1.85	255.05	-2184.48	190.0	58.0
BOT LEFT FRONT SEAT RES (LB)	41.13	2306.03	30.31	58.0	114.0
BOT RIGHT FRONT SEAT X (LB)	-20.85	1004.84	-61.64	71.0	193.0
BOT RIGHT FRONT SEAT Y (LB)	14.62	138.86	-437.45	122.0	62.0
BOT RIGHT FRONT SEAT Z (LB)	15.77	296.44	-2422.38	122.0	62.0
BOT RIGHT FRONT SEAT RES (LB)	30.05	2514.73	13.70	62.0	5.0
BOT LEFT REAR SEAT X (LB)	20.82	106.83	-115.95	121.0	49.0
BOT LEFT REAR SEAT Y (LB)	-22.95	-15.17	-29.67	33.0	381.0
BOT LEFT REAR SEAT Z (LB)	24.56	1072.89	-72.60	59.0	157.0
BOT LEFT REAR SEAT RES (LB)	39.65	1073.17	25.70	59.0	208.0



BOT RIGHT REAR SEAT X (LB)	-24.55	2627.34	-255.42	60.0	189.0
BOT RIGHT REAR SEAT Y (LB)	23.38	291.11	-134.71	19.0	25.0
BOT RIGHT REAR SEAT Z (LB)	9.27	1100.90	-363.88	59.0	27.0
BOT RIGHT REAR SEAT RES (LB)	35.26	2840.21	5.64	59.0	276.0
LEFT SHOULDER FORCE (LB)	9.08	948.60	-0.12	57.0	173.0
RIGHT SHOULDER FORCE (LB)	11.32	1053.53	0.06	61.0	174.0
LEFT LAP FORCE (LB)	12.85	1165.48	-0.72	63.0	364.0
RIGHT LAP FORCE (LB)	14.56	1137.31	5.89	63.0	361.0
INT HEAD X ACCEL (G)	0.01	37.26	-26.28	213.0	60.0
INT HEAD Y ACCEL (G)	0.00	2.40	-1.96	70.0	222.0
INT HEAD Z ACCEL (G)	0.99	2.47	-40.71	226.0	84.0
INT HEAD RESULTANT (G)	0.99	44.83	0.48	84.0	295.0
INT HEAD HIC		137.20		47.0	62.0
INT HEAD Ry ANG ACC (RAD/S2)	0.24	3226.08	-2604.09	219.0	73.0
INT NECK X FORCE (LB)	0.78	41.08	-278.95	192.0	94.0
INT NECK Y FORCE (LB)	-5.07	20.98	-14.22	216.0	117.0
INT NECK Z FORCE (LB)	-11.31	515.71	-38.08	84.0	225.0
INT NECK FORCE RES (LB)	12.43	563.95	11.65	85.0	14.0
INT NECK Mx TORQUE (IN-LB)	7.35	34.32	-155.09	58.0	218.0
INT NECK My TORQUE (IN-LB)	-0.68	757.05	-559.04	74.0	218.0
INT NECK Mz TORQUE (IN-LB)	-5.47	47.67	-68.36	103.0	220.0
LOWER NECK DISPLACEMENT (IN)	0.00	5.84	-0.26	95.0	308.0
INT NECK TORQUE RES (IN-LB)	9.21	757.51	6.76	74.0	271.0
INT CHEST X ACCEL (G)	-0.01	8.92	-42.16	184.0	55.0
INT CHEST Y ACCEL (G)	0.00	5.10	-8.27	85.0	54.0
INT CHEST Z ACCEL (G)	1.00	16.61	-9.61	72.0	84.0
INT CHEST RESULTANT (G)	1.00	43.01	0.08	56.0	229.0
INT CHEST Ry ANG ACC (RAD/S2)	0.60	1164.20	-679.64	64.0	92.0
INT LUMBAR X ACCEL (G)	-0.02	5.84	-52.65	208.0	63.0
INT LUMBAR Y ACCEL (G)	-0.02	3.76	-5.33	87.0	92.0
INT LUMBAR Z ACCEL (G)	1.04	32.69	-4.27	54.0	43.0
INT LUMBAR RESULTANT (G)	1.04	59.84	0.51	64.0	308.0
INT LUMBAR X FORCE (LB)	-1.98	379.41	-186.64	105.0	49.0
INT LUMBAR Y FORCE (LB)	-2.25	26.95	-49.55	83.0	47.0
INT LUMBAR Z FORCE (LB)	-20.57	316.89	-1631.51	84.0	65.0
INT LUMBAR FORCE RES (LB)	20.80	1647.18	18.27	66.0	336.0
INT LUMBAR Mx TORQUE (IN-LB)	1.91	127.05	-280.34	82.0	70.0
INT LUMBAR My TORQUE (IN-LB)	208.03	832.25	-1613.47	49.0	70.0
INT LUMBAR Mz TORQUE (IN-LB)	-28.29	56.71	-54.32	64.0	169.0
INT LUMBAR TORQUE RES (IN-LB)	209.95	1638.46	41.48	70.0	233.0

NIJ SHEAR (LB)		41.08	-278.95	192.0	94.0
NIJ TENSION (LB)		515.71		84.0	
NIJ COMPRESSION (LB)		-38.08		225.0	
NIJ FLEXION (IN-LB)		861.21		75.0	
NIJ EXTENSION (IN-LB)		518.57		218.0	
NIJ NTF	0.0000	0.5866	0.0000	84.0	0.0
NIJ NTE	0.0000	0.4341	0.0000	218.0	0.0
NIJ NCF	0.0000	0.0668	0.0000	353.0	0.0
NIJ NCE	0.0092	0.4347	0.0000	219.0	23.0
NIJ NTF AIS >= 2		0.21			
NIJ NTF AIS >= 3		0.11			
NIJ NTF AIS >= 4		0.12			
NIJ NTF AIS >= 5		0.04			
NIJ NTE AIS >= 2		0.18			
NIJ NTE AIS >= 3		0.09			
NIJ NTE AIS >= 4		0.10			
NIJ NTE AIS >= 5		0.04			
NIJ NCF AIS >= 2		0.12			
NIJ NCF AIS >= 3		0.04			
NIJ NCF AIS >= 4		0.07			
NIJ NCF AIS >= 5		0.02			
NIJ NCE AIS >= 2		0.18			
NIJ NCE AIS >= 3		0.09			
NIJ NCE AIS >= 4		0.10			
NIJ NCE AIS >= 5		0.04			
MNIx	0.0062	0.1298	0.0000	218.0	206.0
NMIz	0.0046	0.0572	0.0001	220.0	38.0

201204 Test: 8617 Test Date: 121018 Subj: HB50 Wt: 165.0  
 Nom G: 24.0 Cell: B

Data ID	Immediate Preimpact	Maximum Value	Minimum Value	Time Of Maximum	Time Of Minimum
Reference Mark Time (Ms)				-212.0	
Impact Rise Time (Ms)				68.0	
Impact Duration (Ms)				104.0	
Velocity Change (Ft/Sec)		53.76			
SLED X ACCEL (G)	0.00	24.85	-0.79	68.0	158.0
SLED Y ACCEL (G)	0.00	0.87	-1.37	16.0	51.0
SLED Z ACCEL (G)	1.00	5.41	-5.11	25.0	21.0
SLED VELOCITY (FT/SEC)	0.16	51.80	0.18	236.0	0.0
INTEGRATED ACCEL (FT/SEC)	0.02	53.76	0.04	103.0	0.0
SEAT FIXTURE X ACCEL (G)	0.01	5.39	-30.18	112.0	38.0
SEAT FIXTURE Y ACCEL (G)	0.00	8.41	-5.80	19.0	25.0
SEAT FIXTURE Z ACCEL (G)	1.01	11.39	-8.70	27.0	21.0
SEAT FIXTURE DRX	-0.01	27.71	-37.37	135.0	71.0
SEAT PAN X ACCEL (G)	0.03	5.08	-29.58	113.0	38.0
SEAT PAN Y ACCEL (G)	0.00	6.08	-3.62	21.0	161.0
SEAT PAN Z ACCEL (G)	1.00	7.16	-6.04	21.0	27.0
SEAT PAN DRX	-0.03	26.95	-36.11	135.0	71.0
TOP LEFT FRONT SEAT X (LB)	-20.87	870.62	-127.33	58.0	179.0
TOP LEFT FRONT SEAT Y (LB)	-4.59	90.41	-70.75	177.0	129.0
TOP LEFT FRONT SEAT Z (LB)	-25.39	1235.75	-147.02	58.0	190.0
TOP LEFT FRONT SEAT RES (LB)	33.29	1511.93	17.16	58.0	357.0
TOP RIGHT FRONT SEAT X (LB)	-24.16	843.33	-93.85	59.0	179.0
TOP RIGHT FRONT SEAT Y (LB)	-33.18	67.63	-114.25	68.0	234.0
TOP RIGHT FRONT SEAT Z (LB)	-53.34	892.06	-264.91	59.0	102.0
TOP RIGHT FRONT SEAT RES (LB)	67.38	1227.60	38.39	59.0	160.0
BOT LEFT FRONT SEAT X (LB)	28.22	1092.17	-42.01	75.0	155.0
BOT LEFT FRONT SEAT Y (LB)	31.48	395.22	-17.99	69.0	162.0
BOT LEFT FRONT SEAT Z (LB)	3.65	215.15	-2071.09	181.0	59.0
BOT LEFT FRONT SEAT RES (LB)	42.51	2203.24	18.82	70.0	164.0
BOT RIGHT FRONT SEAT X (LB)	-22.59	941.26	-38.45	76.0	178.0
BOT RIGHT FRONT SEAT Y (LB)	16.70	97.14	-451.16	124.0	63.0
BOT RIGHT FRONT SEAT Z (LB)	18.36	271.60	-2423.91	179.0	62.0
BOT RIGHT FRONT SEAT RES (LB)	33.69	2517.54	13.17	62.0	6.0
BOT LEFT REAR SEAT X (LB)	18.97	96.41	-145.27	21.0	50.0
BOT LEFT REAR SEAT Y (LB)	-24.57	16.48	-34.29	44.0	49.0
BOT LEFT REAR SEAT Z (LB)	27.85	1036.76	-79.42	60.0	126.0
BOT LEFT REAR SEAT RES (LB)	41.78	1039.03	24.44	60.0	113.0

BOT RIGHT REAR SEAT X (LB)	-27.29	2579.91	-235.92	60.0	178.0
BOT RIGHT REAR SEAT Y (LB)	22.39	272.70	-186.62	20.0	26.0
BOT RIGHT REAR SEAT Z (LB)	-2.56	1029.97	-380.53	58.0	28.0
BOT RIGHT REAR SEAT RES (LB)	35.53	2768.60	10.03	60.0	292.0
LEFT SHOULDER FORCE (LB)	16.88	1130.67	-2.51	61.0	166.0
RIGHT SHOULDER FORCE (LB)	20.62	1076.96	-1.14	60.0	167.0
LEFT LAP FORCE (LB)	14.63	1171.77	2.51	64.0	190.0
RIGHT LAP FORCE (LB)	17.33	1101.23	7.85	64.0	195.0
INT HEAD X ACCEL (G)	0.00	26.30	-23.06	225.0	64.0
INT HEAD Y ACCEL (G)	0.00	8.26	-6.76	231.0	216.0
INT HEAD Z ACCEL (G)	1.00	1.64	-36.64	383.0	52.0
INT HEAD RESULTANT (G)	1.00	41.56	0.37	52.0	15.0
INT HEAD HIC		131.30		46.0	61.0
INT HEAD Ry ANG ACC (RAD/S2)	-0.25	2227.62	-2012.53	226.0	85.0
INT NECK X FORCE (LB)	4.50	53.74	-247.42	233.0	92.0
INT NECK Y FORCE (LB)	-5.30	6.53	-36.13	78.0	96.0
INT NECK Z FORCE (LB)	-10.67	477.39	-27.71	84.0	233.0
INT NECK FORCE RES (LB)	12.74	524.95	7.61	56.0	15.0
INT NECK Mx TORQUE (IN-LB)	6.19	82.91	-68.46	232.0	112.0
INT NECK My TORQUE (IN-LB)	-1.15	680.78	-356.72	85.0	217.0
INT NECK Mz TORQUE (IN-LB)	-4.64	67.49	-52.99	99.0	225.0
LOWER NECK DISPLACEMENT (IN)	0.00	5.22	-0.15	93.0	177.0
INT NECK TORQUE RES (IN-LB)	7.90	683.03	7.46	85.0	11.0
INT CHEST X ACCEL (G)	-0.01	9.76	-39.84	177.0	52.0
INT CHEST Y ACCEL (G)	0.00	4.68	-7.63	85.0	73.0
INT CHEST Z ACCEL (G)	1.00	20.78	-13.63	70.0	84.0
INT CHEST RESULTANT (G)	1.00	40.91	0.41	52.0	217.0
INT CHEST Ry ANG ACC (RAD/S2)	0.46	1075.51	-510.18	66.0	219.0
INT LUMBAR X ACCEL (G)	-0.01	10.75	-54.83	98.0	56.0
INT LUMBAR Y ACCEL (G)	0.00	3.98	-5.52	77.0	69.0
INT LUMBAR Z ACCEL (G)	1.00	39.32	-8.10	56.0	43.0
INT LUMBAR RESULTANT (G)	1.00	67.49	0.37	56.0	177.0
INT LUMBAR X FORCE (LB)	21.68	396.55	-185.05	106.0	50.0
INT LUMBAR Y FORCE (LB)	-9.08	74.80	-101.51	74.0	55.0
INT LUMBAR Z FORCE (LB)	-26.12	356.48	-1859.50	85.0	67.0
INT LUMBAR FORCE RES (LB)	35.15	1877.06	9.23	67.0	235.0
INT LUMBAR Mx TORQUE (IN-LB)	11.35	301.92	-489.56	75.0	56.0
INT LUMBAR My TORQUE (IN-LB)	11.61	775.52	-1714.92	50.0	71.0
INT LUMBAR Mz TORQUE (IN-LB)	6.65	90.34	0.93	124.0	34.0
INT LUMBAR TORQUE RES (IN-LB)	17.55	1721.61	4.52	71.0	17.0

NIJ SHEAR (LB)		53.74	-247.42	233.0	92.0
NIJ TENSION (LB)		477.39		84.0	
NIJ COMPRESSION (LB)		-27.71		233.0	
NIJ FLEXION (IN-LB)		829.13		86.0	
NIJ EXTENSION (IN-LB)		374.75		218.0	
NIJ NTF	0.0000	0.6068	0.0000	84.0	0.0
NIJ NTE	0.0000	0.3744	0.0000	54.0	0.0
NIJ NCF	0.0000	0.0752	0.0000	381.0	0.0
NIJ NCE	0.0113	0.2673	0.0000	230.0	22.0
NIJ NTF AIS >= 2		0.21			
NIJ NTF AIS >= 3		0.12			
NIJ NTF AIS >= 4		0.12			
NIJ NTF AIS >= 5		0.04			
NIJ NTE AIS >= 2		0.17			
NIJ NTE AIS >= 3		0.08			
NIJ NTE AIS >= 4		0.10			
NIJ NTE AIS >= 5		0.03			
NIJ NCF AIS >= 2		0.12			
NIJ NCF AIS >= 3		0.04			
NIJ NCF AIS >= 4		0.07			
NIJ NCF AIS >= 5		0.02			
NIJ NCE AIS >= 2		0.15			
NIJ NCE AIS >= 3		0.06			
NIJ NCE AIS >= 4		0.09			
NIJ NCE AIS >= 5		0.03			
MNIx	0.0052	0.0694	0.0000	232.0	372.0
NMIz	0.0039	0.0565	0.0000	99.0	152.0

201204 Test: 8618 Test Date: 121018 Subj: HB50 Wt: 165.0  
 Nom G: 24.0 Cell: B

Data ID	Immediate Preimpact	Maximum Value	Minimum Value	Time Of Maximum	Time Of Minimum
Reference Mark Time (Ms)				-226.0	
Impact Rise Time (Ms)				69.0	
Impact Duration (Ms)				105.0	
Velocity Change (Ft/Sec)		53.48			
SLED X ACCEL (G)	0.00	24.65	-0.85	69.0	138.0
SLED Y ACCEL (G)	0.00	0.86	-1.30	17.0	51.0
SLED Z ACCEL (G)	1.00	5.62	-5.27	26.0	21.0
SLED VELOCITY (FT/SEC)	0.17	51.10	0.18	243.0	2.0
INTEGRATED ACCEL (FT/SEC)	0.01	53.48	0.03	104.0	0.0
SEAT FIXTURE X ACCEL (G)	0.00	6.71	-29.47	113.0	38.0
SEAT FIXTURE Y ACCEL (G)	0.00	8.43	-6.40	19.0	112.0
SEAT FIXTURE Z ACCEL (G)	1.00	11.08	-8.58	27.0	21.0
SEAT FIXTURE DRX	-0.04	27.17	-37.30	136.0	72.0
SEAT PAN X ACCEL (G)	0.00	6.16	-28.85	114.0	38.0
SEAT PAN Y ACCEL (G)	0.00	5.78	-3.32	21.0	164.0
SEAT PAN Z ACCEL (G)	1.00	7.10	-5.86	22.0	27.0
SEAT PAN DRX	-0.01	26.39	-36.01	136.0	72.0
TOP LEFT FRONT SEAT X (LB)	-18.61	859.92	-129.99	59.0	188.0
TOP LEFT FRONT SEAT Y (LB)	-5.09	98.92	-77.96	184.0	112.0
TOP LEFT FRONT SEAT Z (LB)	-34.62	1299.14	-166.27	60.0	113.0
TOP LEFT FRONT SEAT RES (LB)	39.76	1555.37	21.54	59.0	134.0
TOP RIGHT FRONT SEAT X (LB)	-25.53	807.17	-95.20	60.0	229.0
TOP RIGHT FRONT SEAT Y (LB)	-37.86	59.75	-95.21	31.0	227.0
TOP RIGHT FRONT SEAT Z (LB)	-46.56	974.09	-229.81	59.0	104.0
TOP RIGHT FRONT SEAT RES (LB)	65.27	1264.93	34.74	60.0	159.0
BOT LEFT FRONT SEAT X (LB)	29.26	1007.46	-55.79	76.0	114.0
BOT LEFT FRONT SEAT Y (LB)	27.71	381.24	-41.32	60.0	178.0
BOT LEFT FRONT SEAT Z (LB)	0.72	247.58	-2219.51	185.0	59.0
BOT LEFT FRONT SEAT RES (LB)	40.38	2338.63	18.77	59.0	147.0
BOT RIGHT FRONT SEAT X (LB)	-21.08	835.16	-51.70	76.0	116.0
BOT RIGHT FRONT SEAT Y (LB)	15.95	95.18	-483.08	113.0	63.0
BOT RIGHT FRONT SEAT Z (LB)	13.43	256.74	-2566.14	182.0	63.0
BOT RIGHT FRONT SEAT RES (LB)	29.74	2665.70	15.85	63.0	5.0
BOT LEFT REAR SEAT X (LB)	20.42	85.33	-131.57	158.0	50.0
BOT LEFT REAR SEAT Y (LB)	-23.48	-17.14	-27.69	33.0	2.0
BOT LEFT REAR SEAT Z (LB)	23.29	1065.35	-107.96	60.0	116.0
BOT LEFT REAR SEAT RES (LB)	39.00	1069.09	25.49	60.0	218.0

BOT RIGHT REAR SEAT X (LB)	-26.38	2732.19	-291.99	61.0	114.0
BOT RIGHT REAR SEAT Y (LB)	21.35	279.90	-155.06	19.0	25.0
BOT RIGHT REAR SEAT Z (LB)	8.70	1102.66	-358.30	59.0	28.0
BOT RIGHT REAR SEAT RES (LB)	35.16	2937.02	4.39	60.0	327.0
LEFT SHOULDER FORCE (LB)	16.00	1050.77	-0.84	60.0	179.0
RIGHT SHOULDER FORCE (LB)	10.44	955.78	-0.42	60.0	170.0
LEFT LAP FORCE (LB)	12.20	960.66	8.08	61.0	323.0
RIGHT LAP FORCE (LB)	17.41	1075.21	8.68	61.0	372.0
INT HEAD X ACCEL (G)	0.00	19.48	-25.63	224.0	62.0
INT HEAD Y ACCEL (G)	0.00	10.93	-12.96	231.0	213.0
INT HEAD Z ACCEL (G)	1.01	1.50	-41.46	374.0	52.0
INT HEAD RESULTANT (G)	1.01	45.80	0.25	52.0	14.0
INT HEAD HIC		142.37		47.0	62.0
INT HEAD Ry ANG ACC (RAD/S2)	-0.47	2400.36	-2940.43	214.0	74.0
INT NECK X FORCE (LB)	1.83	69.01	-274.98	220.0	92.0
INT NECK Y FORCE (LB)	-4.66	14.53	-21.60	69.0	108.0
INT NECK Z FORCE (LB)	-12.47	505.84	-17.93	84.0	238.0
INT NECK FORCE RES (LB)	13.45	538.26	10.80	84.0	15.0
INT NECK Mx TORQUE (IN-LB)	6.54	125.80	-70.42	88.0	117.0
INT NECK My TORQUE (IN-LB)	-2.12	808.64	-388.24	76.0	229.0
INT NECK Mz TORQUE (IN-LB)	-5.04	21.56	-52.98	301.0	228.0
LOWER NECK DISPLACEMENT (IN)	0.00	5.65	-0.27	99.0	249.0
INT NECK TORQUE RES (IN-LB)	8.54	811.02	3.70	76.0	162.0
INT CHEST X ACCEL (G)	0.01	8.69	-40.59	181.0	53.0
INT CHEST Y ACCEL (G)	0.00	7.22	-9.60	87.0	54.0
INT CHEST Z ACCEL (G)	1.00	18.40	-9.60	73.0	81.0
INT CHEST RESULTANT (G)	1.00	42.46	0.50	53.0	233.0
INT CHEST Ry ANG ACC (RAD/S2)	0.51	1289.92	-808.06	67.0	109.0
INT LUMBAR X ACCEL (G)	0.02	5.54	-65.39	101.0	56.0
INT LUMBAR Y ACCEL (G)	0.00	5.52	-8.11	68.0	97.0
INT LUMBAR Z ACCEL (G)	0.98	47.69	-6.78	55.0	43.0
INT LUMBAR RESULTANT (G)	0.98	80.55	0.64	55.0	181.0
INT LUMBAR X FORCE (LB)	0.13	429.93	-240.74	109.0	51.0
INT LUMBAR Y FORCE (LB)	-4.61	62.10	-61.50	53.0	68.0
INT LUMBAR Z FORCE (LB)	-25.04	326.37	-1940.75	84.0	66.0
INT LUMBAR FORCE RES (LB)	25.46	1943.90	6.17	67.0	177.0
INT LUMBAR Mx TORQUE (IN-LB)	13.52	435.44	-70.78	54.0	76.0
INT LUMBAR My TORQUE (IN-LB)	112.00	975.92	-1084.65	50.0	108.0
INT LUMBAR Mz TORQUE (IN-LB)	13.36	66.77	-24.20	101.0	256.0
INT LUMBAR TORQUE RES (IN-LB)	113.61	1089.47	16.28	108.0	353.0



NIJ SHEAR (LB)		69.01	-274.98	220.0	92.0
NIJ TENSION (LB)		505.84		84.0	
NIJ COMPRESSION (LB)		-18.98		382.0	
NIJ FLEXION (IN-LB)		902.81		76.0	
NIJ EXTENSION (IN-LB)		392.85		229.0	
NIJ NTF	0.0000	0.5873	0.0000	83.0	0.0
NIJ NTE	0.0000	0.3646	0.0000	50.0	0.0
NIJ NCF	0.0000	0.0663	0.0000	374.0	0.0
NIJ NCE	0.0119	0.2934	0.0000	234.0	23.0
NIJ NTF AIS >= 2		0.21			
NIJ NTF AIS >= 3		0.11			
NIJ NTF AIS >= 4		0.12			
NIJ NTF AIS >= 5		0.04			
NIJ NTE AIS >= 2		0.17			
NIJ NTE AIS >= 3		0.08			
NIJ NTE AIS >= 4		0.09			
NIJ NTE AIS >= 5		0.03			
NIJ NCF AIS >= 2		0.12			
NIJ NCF AIS >= 3		0.04			
NIJ NCF AIS >= 4		0.07			
NIJ NCF AIS >= 5		0.02			
NIJ NCE AIS >= 2		0.15			
NIJ NCE AIS >= 3		0.07			
NIJ NCE AIS >= 4		0.09			
NIJ NCE AIS >= 5		0.03			
MNIx	0.0055	0.1053	0.0000	88.0	62.0
NMIz	0.0042	0.0443	0.0000	228.0	146.0

201204 Test: 8619 Test Date: 121018 Subj: HB50 Wt: 165.0  
 Nom G: 24.0 Cell: B

Data ID	Immediate Preimpact	Maximum Value	Minimum Value	Time Of Maximum	Time Of Minimum
Reference Mark Time (Ms)				-190.0	
Impact Rise Time (Ms)				67.0	
Impact Duration (Ms)				106.0	
Velocity Change (Ft/Sec)		52.93			
SLED X ACCEL (G)	0.01	23.92	-0.68	67.0	137.0
SLED Y ACCEL (G)	0.00	0.89	-1.23	157.0	51.0
SLED Z ACCEL (G)	1.00	5.56	-5.11	25.0	20.0
SLED VELOCITY (FT/SEC)	0.16	51.23	0.18	207.0	1.0
INTEGRATED ACCEL (FT/SEC)	0.03	52.93	0.05	106.0	0.0
SEAT FIXTURE X ACCEL (G)	0.00	5.32	-29.43	113.0	38.0
SEAT FIXTURE Y ACCEL (G)	-0.01	8.09	-6.98	19.0	212.0
SEAT FIXTURE Z ACCEL (G)	1.01	10.89	-8.40	27.0	20.0
SEAT FIXTURE DRX	-0.01	26.11	-36.19	136.0	70.0
SEAT PAN X ACCEL (G)	0.00	4.98	-28.87	112.0	37.0
SEAT PAN Y ACCEL (G)	0.01	6.06	-4.58	20.0	211.0
SEAT PAN Z ACCEL (G)	1.00	7.05	-5.96	21.0	26.0
SEAT PAN DRX	0.00	25.38	-34.98	135.0	70.0
TOP LEFT FRONT SEAT X (LB)	-15.41	827.99	-131.33	58.0	186.0
TOP LEFT FRONT SEAT Y (LB)	-8.87	118.59	-77.31	215.0	130.0
TOP LEFT FRONT SEAT Z (LB)	-37.37	1206.29	-161.34	60.0	281.0
TOP LEFT FRONT SEAT RES (LB)	41.50	1456.69	13.64	59.0	134.0
TOP RIGHT FRONT SEAT X (LB)	-24.16	765.63	-308.40	59.0	198.0
TOP RIGHT FRONT SEAT Y (LB)	-31.32	66.33	-233.12	217.0	198.0
TOP RIGHT FRONT SEAT Z (LB)	-42.58	860.68	-220.56	59.0	102.0
TOP RIGHT FRONT SEAT RES (LB)	58.19	1151.95	13.54	59.0	212.0
BOT LEFT FRONT SEAT X (LB)	23.05	1148.26	-47.93	76.0	204.0
BOT LEFT FRONT SEAT Y (LB)	28.51	399.94	-41.99	68.0	201.0
BOT LEFT FRONT SEAT Z (LB)	2.33	266.97	-2089.01	183.0	69.0
BOT LEFT FRONT SEAT RES (LB)	36.83	2234.40	12.68	69.0	213.0
BOT RIGHT FRONT SEAT X (LB)	-22.03	1032.07	-36.46	77.0	189.0
BOT RIGHT FRONT SEAT Y (LB)	14.07	106.27	-428.34	206.0	63.0
BOT RIGHT FRONT SEAT Z (LB)	17.70	307.58	-2366.98	188.0	63.0
BOT RIGHT FRONT SEAT RES (LB)	31.77	2458.56	13.08	63.0	165.0
BOT LEFT REAR SEAT X (LB)	19.67	2247.39	-109.44	62.0	189.0
BOT LEFT REAR SEAT Y (LB)	-20.85	126.61	-110.12	50.0	136.0
BOT LEFT REAR SEAT Z (LB)	16.59	1018.82	-108.58	61.0	235.0
BOT LEFT REAR SEAT RES (LB)	33.20	2469.34	12.54	61.0	143.0

BOT RIGHT REAR SEAT X (LB)	-26.40	2555.41	-240.79	61.0	189.0
BOT RIGHT REAR SEAT Y (LB)	21.23	241.83	-193.20	19.0	25.0
BOT RIGHT REAR SEAT Z (LB)	6.52	957.32	-408.34	58.0	27.0
BOT RIGHT REAR SEAT RES (LB)	34.64	2704.19	26.29	61.0	5.0
LEFT SHOULDER FORCE (LB)	23.39	1101.02	-1.26	60.0	198.0
RIGHT SHOULDER FORCE (LB)	13.90	904.78	0.48	61.0	197.0
LEFT LAP FORCE (LB)	12.79	1108.91	2.04	65.0	333.0
RIGHT LAP FORCE (LB)	17.28	1031.41	11.53	65.0	350.0
INT HEAD X ACCEL (G)	0.01	52.76	-23.57	198.0	94.0
INT HEAD Y ACCEL (G)	0.00	33.88	-129.20	198.0	99.0
INT HEAD Z ACCEL (G)	1.01	1.75	-39.94	205.0	85.0
INT HEAD RESULTANT (G)	1.01	131.84	0.29	99.0	13.0
INT HEAD HIC		1410.69		97.0	106.0
INT HEAD Ry ANG ACC (RAD/S2)	-0.91	3129.32	-1746.81	199.0	85.0
INT NECK X FORCE (LB)	3.01	73.96	-265.56	222.0	93.0
INT NECK Y FORCE (LB)	-4.93	63.02	-32.09	198.0	82.0
INT NECK Z FORCE (LB)	-13.52	504.16	-74.52	85.0	222.0
INT NECK FORCE RES (LB)	14.70	547.50	9.85	85.0	326.0
INT NECK Mx TORQUE (IN-LB)	8.66	153.56	-106.56	211.0	75.0
INT NECK My TORQUE (IN-LB)	-3.39	698.15	-329.29	100.0	216.0
INT NECK Mz TORQUE (IN-LB)	-6.00	37.23	-36.94	231.0	292.0
LOWER NECK DISPLACEMENT (IN)	0.00	5.42	-0.11	94.0	223.0
INT NECK TORQUE RES (IN-LB)	11.08	698.34	8.81	100.0	181.0
INT CHEST X ACCEL (G)	0.01	10.48	-39.10	179.0	55.0
INT CHEST Y ACCEL (G)	-0.01	5.65	-5.18	87.0	53.0
INT CHEST Z ACCEL (G)	1.00	19.31	-9.96	71.0	83.0
INT CHEST RESULTANT (G)	1.00	39.76	0.22	55.0	229.0
INT CHEST Ry ANG ACC (RAD/S2)	0.09	1113.13	-722.13	65.0	235.0
INT LUMBAR X ACCEL (G)	-0.03	5.40	-55.35	203.0	57.0
INT LUMBAR Y ACCEL (G)	0.00	6.34	-10.21	49.0	70.0
INT LUMBAR Z ACCEL (G)	0.99	45.21	-5.69	57.0	43.0
INT LUMBAR RESULTANT (G)	0.99	71.52	0.45	57.0	182.0
INT LUMBAR X FORCE (LB)	6.80	384.86	-231.02	73.0	52.0
INT LUMBAR Y FORCE (LB)	-10.16	2.90	-103.57	88.0	68.0
INT LUMBAR Z FORCE (LB)	-19.33	504.20	-1744.28	86.0	68.0
INT LUMBAR FORCE RES (LB)	22.88	1765.16	11.11	68.0	308.0
INT LUMBAR Mx TORQUE (IN-LB)	-38.47	-8.25	-802.11	155.0	69.0
INT LUMBAR My TORQUE (IN-LB)	23.43	1012.11	-1688.78	53.0	72.0
INT LUMBAR Mz TORQUE (IN-LB)	3.72	173.66	-4.99	66.0	341.0
INT LUMBAR TORQUE RES (IN-LB)	45.19	1821.25	38.10	72.0	18.0

NIJ SHEAR (LB)		73.96	-265.56	222.0	93.0
NIJ TENSION (LB)		504.16		85.0	
NIJ COMPRESSION (LB)		-74.52		222.0	
NIJ FLEXION (IN-LB)		846.63		99.0	
NIJ EXTENSION (IN-LB)		321.67		216.0	
NIJ NTF	0.0000	0.6167	0.0000	86.0	0.0
NIJ NTE	0.0000	0.3199	0.0000	216.0	0.0
NIJ NCF	0.0000	0.0518	0.0000	381.0	0.0
NIJ NCE	0.0144	0.2353	0.0000	220.0	22.0
NIJ NTF AIS >= 2		0.21			
NIJ NTF AIS >= 3		0.12			
NIJ NTF AIS >= 4		0.12			
NIJ NTF AIS >= 5		0.04			
NIJ NTE AIS >= 2		0.16			
NIJ NTE AIS >= 3		0.07			
NIJ NTE AIS >= 4		0.09			
NIJ NTE AIS >= 5		0.03			
NIJ NCF AIS >= 2		0.12			
NIJ NCF AIS >= 3		0.04			
NIJ NCF AIS >= 4		0.07			
NIJ NCF AIS >= 5		0.02			
NIJ NCE AIS >= 2		0.15			
NIJ NCE AIS >= 3		0.06			
NIJ NCE AIS >= 4		0.08			
NIJ NCE AIS >= 5		0.03			
MNIx	0.0072	0.1285	0.0000	211.0	320.0
NMIz	0.0050	0.0312	0.0000	231.0	50.0

201204 Test: 8621 Test Date: 121022 Subj: HB50 Wt: 165.0  
 Nom G: 18.0 Cell: C

Data ID	Immediate Preimpact	Maximum Value	Minimum Value	Time Of Maximum	Time Of Minimum
Reference Mark Time (Ms)				-181.0	
Impact Rise Time (Ms)				74.0	
Impact Duration (Ms)				122.0	
Velocity Change (Ft/Sec)		46.10			
SLED X ACCEL (G)	0.01	17.89	-1.50	74.0	126.0
SLED Y ACCEL (G)	0.00	1.15	-1.25	49.0	55.0
SLED Z ACCEL (G)	1.00	3.78	-2.51	27.0	22.0
SLED VELOCITY (FT/SEC)	0.18	42.64	0.18	310.0	1.0
INTEGRATED ACCEL (FT/SEC)	0.01	46.10	0.04	122.0	0.0
SEAT FIXTURE X ACCEL (G)	0.00	4.36	-3.87	30.0	22.0
SEAT FIXTURE Y ACCEL (G)	0.00	3.68	-1.39	80.0	191.0
SEAT FIXTURE Z ACCEL (G)	1.01	21.69	-2.56	60.0	166.0
SEAT FIXTURE DRX	-0.01	0.23	-0.15	22.0	161.0
SEAT PAN X ACCEL (G)	0.00	29.30	-27.84	133.0	120.0
SEAT PAN Y ACCEL (G)	0.01	63.35	-62.09	124.0	118.0
SEAT PAN Z ACCEL (G)	1.00	34.17	-17.73	115.0	263.0
SEAT PAN DRX	0.00	8.54	-11.29	200.0	329.0
TOP LEFT FRONT SEAT X (LB)	-15.26	517.97	-77.33	102.0	247.0
TOP LEFT FRONT SEAT Y (LB)	-19.17	5.24	-48.47	56.0	254.0
TOP LEFT FRONT SEAT Z (LB)	-31.09	384.05	-358.62	334.0	51.0
TOP LEFT FRONT SEAT RES (LB)	39.69	523.78	28.19	102.0	10.0
TOP RIGHT FRONT SEAT X (LB)	-26.69	498.80	-92.52	104.0	248.0
TOP RIGHT FRONT SEAT Y (LB)	-27.20	5.91	-55.16	415.0	128.0
TOP RIGHT FRONT SEAT Z (LB)	-36.00	325.96	-408.52	344.0	52.0
TOP RIGHT FRONT SEAT RES (LB)	52.47	514.35	37.39	104.0	11.0
BOT LEFT FRONT SEAT X (LB)	24.29	57.12	16.41	71.0	290.0
BOT LEFT FRONT SEAT Y (LB)	43.82	64.00	-273.31	210.0	293.0
BOT LEFT FRONT SEAT Z (LB)	-1.22	344.95	-23.08	295.0	162.0
BOT LEFT FRONT SEAT RES (LB)	50.17	438.40	36.69	295.0	334.0
BOT RIGHT FRONT SEAT X (LB)	-23.66	7.29	-38.44	75.0	290.0
BOT RIGHT FRONT SEAT Y (LB)	-1.78	323.36	-22.17	294.0	142.0
BOT RIGHT FRONT SEAT Z (LB)	4.63	355.33	-17.98	291.0	404.0
BOT RIGHT FRONT SEAT RES (LB)	24.33	480.16	8.61	294.0	10.0
BOT LEFT REAR SEAT X (LB)	18.79	697.02	-185.00	88.0	291.0
BOT LEFT REAR SEAT Y (LB)	-29.75	85.71	-150.33	52.0	293.0
BOT LEFT REAR SEAT Z (LB)	1.41	524.35	-546.69	59.0	293.0
BOT LEFT REAR SEAT RES (LB)	35.30	796.75	34.88	87.0	2.0

BOT RIGHT REAR SEAT X (LB)	-29.87	622.42	-235.31	86.0	292.0
BOT RIGHT REAR SEAT Y (LB)	17.69	141.28	-103.17	67.0	292.0
BOT RIGHT REAR SEAT Z (LB)	16.06	597.04	-467.52	61.0	291.0
BOT RIGHT REAR SEAT RES (LB)	38.33	773.03	24.01	81.0	8.0
LEFT SHOULDER FORCE (LB)	16.34	1010.89	-0.12	104.0	218.0
RIGHT SHOULDER FORCE (LB)	9.69	866.71	9.51	91.0	6.0
LEFT LAP FORCE (LB)	12.25	994.29	12.10	87.0	5.0
RIGHT LAP FORCE (LB)	13.79	954.68	8.03	117.0	419.0
INT HEAD X ACCEL (G)	-0.01	25.89	-35.65	183.0	123.0
INT HEAD Y ACCEL (G)	0.00	4.56	-8.96	112.0	186.0
INT HEAD Z ACCEL (G)	1.00	5.78	-22.20	211.0	122.0
INT HEAD RESULTANT (G)	1.00	41.99	0.25	123.0	380.0
INT HEAD HIC		123.33		120.0	135.0
INT HEAD Ry ANG ACC (RAD/S2)	-0.53	4063.52	-3279.90	181.0	129.0
INT NECK X FORCE (LB)	5.82	6.25	-405.00	7.0	123.0
INT NECK Y FORCE (LB)	-6.78	20.28	-43.67	294.0	144.0
INT NECK Z FORCE (LB)	-14.48	405.24	-205.30	126.0	300.0
INT NECK FORCE RES (LB)	17.02	563.94	6.73	125.0	24.0
INT NECK Mx TORQUE (IN-LB)	6.58	116.95	-131.69	112.0	139.0
INT NECK My TORQUE (IN-LB)	-6.43	949.41	-359.14	130.0	179.0
INT NECK Mz TORQUE (IN-LB)	-6.61	98.56	-73.71	116.0	273.0
LOWER NECK DISPLACEMENT (IN)	0.00	0.03	-0.02	128.0	35.0
INT NECK TORQUE RES (IN-LB)	11.34	956.64	11.17	130.0	4.0
INT CHEST X ACCEL (G)	0.00	11.22	-20.46	168.0	87.0
INT CHEST Y ACCEL (G)	0.00	2.90	-6.03	126.0	119.0
INT CHEST Z ACCEL (G)	0.98	23.39	-10.01	118.0	80.0
INT CHEST RESULTANT (G)	0.98	28.55	0.27	118.0	332.0
INT CHEST Ry ANG ACC (RAD/S2)	0.10	822.12	-821.30	197.0	114.0
INT LUMBAR X ACCEL (G)	0.04	15.71	-19.28	157.0	145.0
INT LUMBAR Y ACCEL (G)	-0.01	7.99	-8.24	105.0	114.0
INT LUMBAR Z ACCEL (G)	1.01	27.37	-6.78	117.0	294.0
INT LUMBAR RESULTANT (G)	1.01	27.65	0.54	117.0	335.0
INT LUMBAR X FORCE (LB)	20.56	681.63	-304.20	134.0	89.0
INT LUMBAR Y FORCE (LB)	-6.68	137.20	-84.98	116.0	89.0
INT LUMBAR Z FORCE (LB)	-15.73	618.52	-221.56	124.0	233.0
INT LUMBAR FORCE RES (LB)	26.75	831.90	13.59	133.0	22.0
INT LUMBAR Mx TORQUE (IN-LB)	-10.48	976.57	-326.60	116.0	89.0
INT LUMBAR My TORQUE (IN-LB)	-165.78	2182.81	-2849.73	90.0	135.0
INT LUMBAR Mz TORQUE (IN-LB)	-2.80	283.52	-3.95	114.0	14.0
INT LUMBAR TORQUE RES (IN-LB)	166.14	2916.73	53.33	135.0	316.0

NIJ SHEAR (LB)		6.49	-405.00	-21.0	123.0
NIJ TENSION (LB)		405.24		126.0	
NIJ COMPRESSION (LB)		-205.30		300.0	
NIJ FLEXION (IN-LB)		1205.17		130.0	
NIJ EXTENSION (IN-LB)		244.19		180.0	
NIJ NTF	0.0000	0.6923	0.0000	130.0	0.0
NIJ NTE	0.0000	0.4135	0.0000	169.0	0.0
NIJ NCF	0.0000	0.2941	0.0000	213.0	0.0
NIJ NCE	0.0192	0.0719	0.0000	186.0	23.0
NIJ NTF AIS >= 2		0.23			
NIJ NTF AIS >= 3		0.13			
NIJ NTF AIS >= 4		0.13			
NIJ NTF AIS >= 5		0.05			
NIJ NTE AIS >= 2		0.17			
NIJ NTE AIS >= 3		0.08			
NIJ NTE AIS >= 4		0.10			
NIJ NTE AIS >= 5		0.03			
NIJ NCF AIS >= 2		0.15			
NIJ NCF AIS >= 3		0.07			
NIJ NCF AIS >= 4		0.09			
NIJ NCF AIS >= 5		0.03			
NIJ NCE AIS >= 2		0.12			
NIJ NCE AIS >= 3		0.04			
NIJ NCE AIS >= 4		0.07			
NIJ NCE AIS >= 5		0.02			
MNIx	0.0055	0.1102	0.0001	139.0	418.0
NMIz	0.0055	0.0825	0.0001	116.0	146.0

201204 Test: 8622 Test Date: 121022 Subj: HB50 Wt: 165.0  
 Nom G: 18.0 Cell: D

Data ID	Immediate Preimpact	Maximum Value	Minimum Value	Time Of Maximum	Time Of Minimum
Reference Mark Time (Ms)				-148.0	
Impact Rise Time (Ms)				74.0	
Impact Duration (Ms)				123.0	
Velocity Change (Ft/Sec)		46.39			
SLED X ACCEL (G)	0.01	17.90	-1.41	74.0	127.0
SLED Y ACCEL (G)	0.00	0.99	-1.06	49.0	55.0
SLED Z ACCEL (G)	1.00	3.83	-2.55	28.0	23.0
SLED VELOCITY (FT/SEC)	0.18	43.12	0.19	133.0	2.0
INTEGRATED ACCEL (FT/SEC)	0.01	46.39	0.02	123.0	0.0
SEAT FIXTURE X ACCEL (G)	0.01	4.54	-3.61	31.0	23.0
SEAT FIXTURE Y ACCEL (G)	0.01	3.10	-1.68	45.0	375.0
SEAT FIXTURE Z ACCEL (G)	1.00	21.87	-1.33	60.0	167.0
SEAT FIXTURE DRX	0.00	0.27	-0.15	87.0	167.0
SEAT PAN X ACCEL (G)	-0.01	37.63	-36.78	193.0	152.0
SEAT PAN Y ACCEL (G)	0.00	72.29	-76.91	124.0	136.0
SEAT PAN Z ACCEL (G)	1.00	20.23	-10.64	109.0	56.0
SEAT PAN DRX	-0.01	35.10	-32.85	225.0	277.0
TOP LEFT FRONT SEAT X (LB)	-14.74	459.35	-46.00	98.0	429.0
TOP LEFT FRONT SEAT Y (LB)	-19.98	19.65	-52.41	48.0	257.0
TOP LEFT FRONT SEAT Z (LB)	-28.25	347.42	-366.03	326.0	50.0
TOP LEFT FRONT SEAT RES (LB)	37.70	479.08	23.91	98.0	11.0
TOP RIGHT FRONT SEAT X (LB)	-26.46	457.89	-47.60	99.0	268.0
TOP RIGHT FRONT SEAT Y (LB)	-28.34	-12.48	-68.29	418.0	40.0
TOP RIGHT FRONT SEAT Z (LB)	-38.70	146.01	-531.69	326.0	53.0
TOP RIGHT FRONT SEAT RES (LB)	54.85	588.35	22.79	60.0	184.0
BOT LEFT FRONT SEAT X (LB)	24.47	55.80	16.41	82.0	284.0
BOT LEFT FRONT SEAT Y (LB)	35.84	44.66	-116.65	86.0	300.0
BOT LEFT FRONT SEAT Z (LB)	4.80	170.26	-4.99	298.0	437.0
BOT LEFT FRONT SEAT RES (LB)	43.72	205.96	35.71	298.0	355.0
BOT RIGHT FRONT SEAT X (LB)	-22.97	9.28	-29.82	83.0	265.0
BOT RIGHT FRONT SEAT Y (LB)	4.46	142.77	-9.13	302.0	23.0
BOT RIGHT FRONT SEAT Z (LB)	12.40	158.74	-3.10	305.0	373.0
BOT RIGHT FRONT SEAT RES (LB)	26.59	212.86	0.90	302.0	59.0
BOT LEFT REAR SEAT X (LB)	18.29	684.67	-287.29	85.0	183.0
BOT LEFT REAR SEAT Y (LB)	-29.69	104.83	-111.42	65.0	182.0
BOT LEFT REAR SEAT Z (LB)	-3.03	632.29	-489.57	59.0	183.0
BOT LEFT REAR SEAT RES (LB)	35.50	827.57	33.07	76.0	2.0



BOT RIGHT REAR SEAT X (LB)	-27.76	578.50	-309.06	85.0	183.0
BOT RIGHT REAR SEAT Y (LB)	21.96	132.08	-38.77	78.0	182.0
BOT RIGHT REAR SEAT Z (LB)	13.26	646.33	-251.01	78.0	184.0
BOT RIGHT REAR SEAT RES (LB)	37.90	859.18	23.01	78.0	16.0
LEFT SHOULDER FORCE (LB)	14.02	694.79	14.07	133.0	0.0
RIGHT SHOULDER FORCE (LB)	19.19	871.90	19.21	127.0	6.0
LEFT LAP FORCE (LB)	14.96	852.04	14.73	85.0	0.0
RIGHT LAP FORCE (LB)	20.15	781.29	19.92	86.0	5.0
INT HEAD X ACCEL (G)	0.01	27.77	-32.86	157.0	132.0
INT HEAD Y ACCEL (G)	0.00	3.63	-3.62	136.0	160.0
INT HEAD Z ACCEL (G)	1.01	12.45	-14.81	163.0	82.0
INT HEAD RESULTANT (G)	1.01	33.41	0.07	132.0	386.0
INT HEAD HIC		64.41		127.0	142.0
INT HEAD Ry ANG ACC (RAD/S2)	-1.28	2438.98	-2687.42	156.0	136.0
INT NECK X FORCE (LB)	3.68	4.87	-283.87	19.0	190.0
INT NECK Y FORCE (LB)	-5.86	24.87	-27.75	143.0	338.0
INT NECK Z FORCE (LB)	-13.10	714.21	-56.00	138.0	328.0
INT NECK FORCE RES (LB)	14.82	741.30	8.03	138.0	21.0
INT NECK Mx TORQUE (IN-LB)	7.78	78.92	-142.80	169.0	142.0
INT NECK My TORQUE (IN-LB)	-3.35	655.75	-325.16	136.0	35.0
INT NECK Mz TORQUE (IN-LB)	-6.64	84.88	-38.48	123.0	83.0
LOWER NECK DISPLACEMENT (IN)	0.00	0.03	-0.02	129.0	9.0
INT NECK TORQUE RES (IN-LB)	10.78	665.54	7.57	136.0	19.0
INT CHEST X ACCEL (G)	0.01	9.41	-20.72	186.0	86.0
INT CHEST Y ACCEL (G)	0.00	2.48	-7.38	140.0	134.0
INT CHEST Z ACCEL (G)	1.01	20.88	-8.51	107.0	75.0
INT CHEST RESULTANT (G)	1.01	24.75	0.13	106.0	363.0
INT CHEST Ry ANG ACC (RAD/S2)	0.09	3053.94	-2046.10	132.0	137.0
INT LUMBAR X ACCEL (G)	0.00	20.93	-37.22	184.0	145.0
INT LUMBAR Y ACCEL (G)	0.01	7.54	-9.56	149.0	156.0
INT LUMBAR Z ACCEL (G)	1.00	29.65	-9.68	133.0	186.0
INT LUMBAR RESULTANT (G)	1.00	44.89	0.22	145.0	408.0
INT LUMBAR X FORCE (LB)	7.73	531.54	-433.68	123.0	87.0
INT LUMBAR Y FORCE (LB)	-3.71	13.90	-161.70	60.0	100.0
INT LUMBAR Z FORCE (LB)	-13.70	1330.61	-15.24	156.0	7.0
INT LUMBAR FORCE RES (LB)	16.17	1428.02	5.57	139.0	21.0
INT LUMBAR Mx TORQUE (IN-LB)	-43.63	192.04	-901.21	367.0	101.0
INT LUMBAR My TORQUE (IN-LB)	51.23	2841.68	-2564.95	88.0	139.0
INT LUMBAR Mz TORQUE (IN-LB)	-33.61	159.95	-88.08	159.0	428.0
INT LUMBAR TORQUE RES (IN-LB)	75.22	2855.39	25.03	89.0	269.0

NIJ SHEAR (LB)		4.87	-283.87	19.0	190.0
NIJ TENSION (LB)		714.21		138.0	
NIJ COMPRESSION (LB)		-56.00		328.0	
NIJ FLEXION (IN-LB)		800.23		135.0	
NIJ EXTENSION (IN-LB)		242.46		35.0	
NIJ NTF	0.0000	0.7436	0.0000	137.0	0.0
NIJ NTE	0.0000	0.3407	0.0000	35.0	0.0
NIJ NCF	0.0000	0.0602	0.0000	328.0	0.0
NIJ NCE	0.0144	0.0166	0.0000	1.0	21.0
NIJ NTF AIS >= 2		0.24			
NIJ NTF AIS >= 3		0.15			
NIJ NTF AIS >= 4		0.14			
NIJ NTF AIS >= 5		0.05			
NIJ NTE AIS >= 2		0.16			
NIJ NTE AIS >= 3		0.07			
NIJ NTE AIS >= 4		0.09			
NIJ NTE AIS >= 5		0.03			
NIJ NCF AIS >= 2		0.12			
NIJ NCF AIS >= 3		0.04			
NIJ NCF AIS >= 4		0.07			
NIJ NCF AIS >= 5		0.02			
NIJ NCE AIS >= 2		0.12			
NIJ NCE AIS >= 3		0.04			
NIJ NCE AIS >= 4		0.06			
NIJ NCE AIS >= 5		0.02			
MNIx	0.0065	0.1195	0.0000	142.0	22.0
NMIz	0.0056	0.0710	0.0001	123.0	33.0

201204 Test: 8623 Test Date: 121022 Subj: AERO95 Wt: 234.0  
 Nom G: 24.0 Cell: E

Data ID	Immediate Preimpact	Maximum Value	Minimum Value	Time Of Maximum	Time Of Minimum
Reference Mark Time (Ms)				-221.0	
Impact Rise Time (Ms)				63.0	
Impact Duration (Ms)				102.0	
Velocity Change (Ft/Sec)		53.15			
SLED X ACCEL (G)	0.00	25.17	-2.43	63.0	113.0
SLED Y ACCEL (G)	0.00	1.07	-1.20	16.0	11.0
SLED Z ACCEL (G)	1.00	5.25	-4.37	26.0	21.0
SLED VELOCITY (FT/SEC)	0.18	48.63	0.17	212.0	0.0
INTEGRATED ACCEL (FT/SEC)	-0.02	53.15	0.00	102.0	0.0
SEAT FIXTURE X ACCEL (G)	0.00	6.98	-6.24	28.0	22.0
SEAT FIXTURE Y ACCEL (G)	0.00	4.86	-2.06	56.0	407.0
SEAT FIXTURE Z ACCEL (G)	1.00	31.41	-4.68	55.0	120.0
SEAT FIXTURE DRX	0.00	0.38	-0.32	74.0	143.0
SEAT PAN X ACCEL (G)	0.00	23.93	-13.48	34.0	28.0
SEAT PAN Y ACCEL (G)	0.00	23.77	-2.57	68.0	105.0
SEAT PAN Z ACCEL (G)	1.00	15.04	-0.89	60.0	462.0
SEAT PAN DRX	0.00	1.09	-0.87	26.0	160.0
TOP LEFT FRONT SEAT X (LB)	-16.69	573.28	-49.33	77.0	514.0
TOP LEFT FRONT SEAT Y (LB)	-21.54	12.45	-56.99	52.0	271.0
TOP LEFT FRONT SEAT Z (LB)	-10.40	353.00	-409.46	282.0	40.0
TOP LEFT FRONT SEAT RES (LB)	29.34	579.55	24.55	77.0	9.0
TOP RIGHT FRONT SEAT X (LB)	-26.45	736.71	-90.50	82.0	456.0
TOP RIGHT FRONT SEAT Y (LB)	-27.88	9.85	-45.31	192.0	99.0
TOP RIGHT FRONT SEAT Z (LB)	-33.25	193.46	-611.19	365.0	45.0
TOP RIGHT FRONT SEAT RES (LB)	50.88	854.53	35.20	82.0	11.0
BOT LEFT FRONT SEAT X (LB)	22.82	88.62	19.69	251.0	103.0
BOT LEFT FRONT SEAT Y (LB)	58.24	75.98	-86.65	68.0	387.0
BOT LEFT FRONT SEAT Z (LB)	-14.75	94.80	-63.62	386.0	175.0
BOT LEFT FRONT SEAT RES (LB)	64.32	138.23	37.77	381.0	418.0
BOT RIGHT FRONT SEAT X (LB)	-21.03	20.55	-31.81	57.0	576.0
BOT RIGHT FRONT SEAT Y (LB)	-11.76	49.55	-39.12	364.0	64.0
BOT RIGHT FRONT SEAT Z (LB)	-6.77	102.31	-39.68	382.0	678.0
BOT RIGHT FRONT SEAT RES (LB)	25.18	112.87	12.51	382.0	326.0
BOT LEFT REAR SEAT X (LB)	20.44	1029.15	-478.10	73.0	215.0
BOT LEFT REAR SEAT Y (LB)	-43.01	164.83	-234.06	58.0	387.0
BOT LEFT REAR SEAT Z (LB)	-19.35	785.55	-532.39	60.0	224.0
BOT LEFT REAR SEAT RES (LB)	51.46	1278.39	52.20	70.0	0.0

BOT RIGHT REAR SEAT X (LB)	-26.05	975.35	-348.69	72.0	217.0
BOT RIGHT REAR SEAT Y (LB)	7.83	224.04	-107.09	71.0	229.0
BOT RIGHT REAR SEAT Z (LB)	8.06	856.63	-191.18	70.0	226.0
BOT RIGHT REAR SEAT RES (LB)	28.54	1307.42	15.92	70.0	8.0
LEFT SHOULDER FORCE (LB)	0.00	4.61	-1.92	53.0	191.0
RIGHT SHOULDER FORCE (LB)	0.50	3.67	-0.66	85.0	19.0
LEFT LAP FORCE (LB)	-1.79	3.41	-4.97	77.0	138.0
RIGHT LAP FORCE (LB)	1.97	5.17	0.06	76.0	177.0

201204 Test: 8704 Test Date: 130219 Subj: AERO50 Wt: 165.0  
 Nom G: 18.0 Cell: U

Data ID	Immediate Preimpact	Maximum Value	Minimum Value	Time Of Maximum	Time Of Minimum
Reference Mark Time (Ms)				-196.0	
Impact Rise Time (Ms)				72.0	
Impact Duration (Ms)				123.0	
Velocity Change (Ft/Sec)		46.73			
SLED X ACCEL (G)	0.02	18.01	-1.34	72.0	126.0
SLED Y ACCEL (G)	0.00	0.64	-1.18	26.0	32.0
SLED Z ACCEL (G)	1.00	4.86	-1.19	25.0	52.0
SLED VELOCITY (FT/SEC)	0.19	45.15	0.21	138.0	2.0
INTEGRATED ACCEL (FT/SEC)	0.01	46.73	0.03	122.0	0.0
SEAT FIXTURE X ACCEL (G)	0.02	21.99	-3.98	48.0	153.0
SEAT FIXTURE Y ACCEL (G)	-0.01	1.60	-3.38	204.0	52.0
SEAT FIXTURE Z ACCEL (G)	1.01	7.33	-5.51	27.0	33.0
SEAT FIXTURE DRX	0.04	26.00	-11.39	71.0	150.0
SEAT PAN X ACCEL (G)	-0.01	18.62	-60.53	249.0	80.0
SEAT PAN Y ACCEL (G)	-0.05	7.85	-6.67	75.0	122.0
SEAT PAN Z ACCEL (G)	1.00	23.17	-14.86	162.0	145.0
SEAT PAN DRX	-0.01	32.23	-33.76	261.0	105.0
TOP LEFT FRONT SEAT X (LB)	19.41	163.27	-906.01	273.0	106.0
TOP LEFT FRONT SEAT Y (LB)	33.09	75.36	-40.82	286.0	57.0
TOP LEFT FRONT SEAT Z (LB)	72.29	953.23	-323.05	57.0	319.0
TOP LEFT FRONT SEAT RES (LB)	82.04	1070.73	68.73	106.0	11.0
TOP RIGHT FRONT SEAT X (LB)	41.73	146.73	-885.75	271.0	106.0
TOP RIGHT FRONT SEAT Y (LB)	45.12	101.78	30.43	61.0	243.0
TOP RIGHT FRONT SEAT Z (LB)	61.21	1055.05	-164.67	58.0	319.0
TOP RIGHT FRONT SEAT RES (LB)	86.84	1167.61	44.04	59.0	185.0
BOT LEFT FRONT SEAT X (LB)	-35.86	-8.39	-88.09	275.0	13.0
BOT LEFT FRONT SEAT Y (LB)	-70.10	469.27	-105.59	274.0	325.0
BOT LEFT FRONT SEAT Z (LB)	3.24	24.32	-368.48	327.0	275.0
BOT LEFT FRONT SEAT RES (LB)	78.89	595.59	48.14	274.0	311.0
BOT RIGHT FRONT SEAT X (LB)	41.15	68.85	-9.53	277.0	75.0
BOT RIGHT FRONT SEAT Y (LB)	-2.41	56.29	-522.21	205.0	277.0
BOT RIGHT FRONT SEAT Z (LB)	-13.55	40.69	-586.59	125.0	277.0
BOT RIGHT FRONT SEAT RES (LB)	43.55	788.37	24.60	277.0	10.0
BOT LEFT REAR SEAT X (LB)	-18.20	-12.48	-45.77	24.0	179.0
BOT LEFT REAR SEAT Y (LB)	-42.21	208.75	-203.48	80.0	281.0
BOT LEFT REAR SEAT Z (LB)	-41.29	-31.66	-48.49	107.0	41.0
BOT LEFT REAR SEAT RES (LB)	61.98	215.57	46.52	80.0	22.0

BOT RIGHT REAR SEAT X (LB)	47.99	367.53	-1211.78	276.0	82.0
BOT RIGHT REAR SEAT Y (LB)	-30.03	82.07	-304.09	276.0	81.0
BOT RIGHT REAR SEAT Z (LB)	-11.83	388.81	-1261.21	278.0	81.0
BOT RIGHT REAR SEAT RES (LB)	58.03	1768.61	29.61	81.0	11.0
LEFT SHOULDER FORCE (LB)	21.64	1019.33	1.02	104.0	242.0
RIGHT SHOULDER FORCE (LB)	19.10	1033.63	-1.02	112.0	236.0
LEFT LAP FORCE (LB)	3.53	580.83	3.22	89.0	7.0
RIGHT LAP FORCE (LB)	5.44	549.09	4.92	88.0	5.0
INT HEAD X ACCEL (G)	-0.01	29.90	-33.77	189.0	127.0
INT HEAD Y ACCEL (G)	0.01	4.70	-2.01	163.0	214.0
INT HEAD Z ACCEL (G)	1.01	3.07	-28.16	260.0	121.0
INT HEAD RESULTANT (G)	1.01	40.70	0.27	124.0	349.0
INT HEAD HIC		125.94		117.0	132.0
INT HEAD Ry ANG ACC (RAD/S2)	-0.96	2554.21	-4070.50	190.0	132.0
INT NECK X FORCE (LB)	1.98	4.46	-498.11	7.0	135.0
INT NECK Y FORCE (LB)	-4.80	46.05	-17.86	133.0	92.0
INT NECK Z FORCE (LB)	-11.88	388.35	-245.21	129.0	258.0
INT NECK FORCE RES (LB)	12.96	623.70	6.57	136.0	30.0
INT NECK Mx TORQUE (IN-LB)	6.58	106.46	-55.90	148.0	175.0
INT NECK My TORQUE (IN-LB)	-6.92	1029.49	-377.98	132.0	289.0
INT NECK Mz TORQUE (IN-LB)	-6.71	38.20	-20.69	128.0	262.0
INT NECK TORQUE RES (IN-LB)	11.69	1030.41	11.35	132.0	11.0
INT CHEST X ACCEL (G)	0.00	5.76	-29.17	173.0	81.0
INT CHEST Y ACCEL (G)	0.00	2.34	-3.72	166.0	81.0
INT CHEST Z ACCEL (G)	1.01	17.63	-10.57	119.0	76.0
INT CHEST RESULTANT (G)	1.01	30.58	0.41	81.0	339.0
INT CHEST Ry ANG ACC (RAD/S2)	-0.24	642.99	-736.97	153.0	118.0
INT LUMBAR X ACCEL (G)	0.00	24.43	-28.77	152.0	69.0
INT LUMBAR Y ACCEL (G)	0.00	3.55	-4.09	145.0	152.0
INT LUMBAR Z ACCEL (G)	1.00	20.16	-8.48	117.0	75.0
INT LUMBAR RESULTANT (G)	1.00	29.04	0.71	69.0	393.0
INT LUMBAR X FORCE (LB)	21.02	453.91	-459.18	139.0	84.0
INT LUMBAR Y FORCE (LB)	-5.44	30.20	-162.85	154.0	121.0
INT LUMBAR Z FORCE (LB)	-26.83	603.49	-311.68	84.0	168.0
INT LUMBAR FORCE RES (LB)	34.52	758.49	14.34	84.0	41.0
INT LUMBAR Mx TORQUE (IN-LB)	14.96	171.97	-952.99	155.0	121.0
INT LUMBAR My TORQUE (IN-LB)	111.48	2783.70	-2108.73	86.0	140.0
INT LUMBAR Mz TORQUE (IN-LB)	21.04	112.87	-6.33	85.0	217.0
INT LUMBAR TORQUE RES (IN-LB)	114.43	2789.35	24.32	86.0	264.0
NIJ SHEAR (LB)		4.46	-498.11	7.0	135.0

NIJ TENSION (LB)		388.35		129.0	
NIJ COMPRESSION (LB)		-245.21		258.0	
NIJ FLEXION (IN-LB)		1358.47		133.0	
NIJ EXTENSION (IN-LB)		256.06		290.0	
NIJ NTF	0.0000	0.7379	0.0000	132.0	0.0
NIJ NTE	0.0000	0.1765	0.0000	173.0	0.0
NIJ NCF	0.0000	0.2267	0.0000	253.0	0.0
NIJ NCE	0.0155	0.3551	0.0000	287.0	32.0
NIJ NTF AIS >= 2		0.24			
NIJ NTF AIS >= 3		0.15			
NIJ NTF AIS >= 4		0.14			
NIJ NTF AIS >= 5		0.05			
NIJ NTE AIS >= 2		0.14			
NIJ NTE AIS >= 3		0.05			
NIJ NTE AIS >= 4		0.08			
NIJ NTE AIS >= 5		0.03			
NIJ NCF AIS >= 2		0.14			
NIJ NCF AIS >= 3		0.06			
NIJ NCF AIS >= 4		0.08			
NIJ NCF AIS >= 5		0.03			
NIJ NCE AIS >= 2		0.16			
NIJ NCE AIS >= 3		0.07			
NIJ NCE AIS >= 4		0.09			
NIJ NCE AIS >= 5		0.03			
MNIx	0.0055	0.0891	0.0002	148.0	207.0
NMIz	0.0056	0.0320	0.0003	128.0	97.0

201204 Test: 8705 Test Date: 130219 Subj: AERO50 Wt: 165.0  
 Nom G: 18.0 Cell: U

Data ID	Immediate Preimpact	Maximum Value	Minimum Value	Time Of Maximum	Time Of Minimum
Reference Mark Time (Ms)				-150.0	
Impact Rise Time (Ms)				72.0	
Impact Duration (Ms)				123.0	
Velocity Change (Ft/Sec)		46.53			
SLED X ACCEL (G)	0.00	18.20	-1.78	72.0	127.0
SLED Y ACCEL (G)	0.00	0.72	-1.19	27.0	33.0
SLED Z ACCEL (G)	1.00	3.47	-1.01	25.0	20.0
SLED VELOCITY (FT/SEC)	0.18	44.22	0.21	126.0	0.0
INTEGRATED ACCEL (FT/SEC)	0.03	46.53	0.05	122.0	0.0
SEAT FIXTURE X ACCEL (G)	-0.01	23.00	-2.84	64.0	160.0
SEAT FIXTURE Y ACCEL (G)	0.03	1.50	-3.91	129.0	53.0
SEAT FIXTURE Z ACCEL (G)	0.98	6.97	-3.41	26.0	33.0
SEAT FIXTURE DRX	0.00	25.88	-11.82	71.0	149.0
SEAT PAN X ACCEL (G)	0.01	13.46	-29.39	260.0	89.0
SEAT PAN Y ACCEL (G)	0.00	7.30	-8.58	258.0	146.0
SEAT PAN Z ACCEL (G)	1.00	12.00	-13.86	150.0	79.0
SEAT PAN DRX	0.02	18.22	-31.14	392.0	107.0
TOP LEFT FRONT SEAT X (LB)	29.47	268.94	-970.12	244.0	109.0
TOP LEFT FRONT SEAT Y (LB)	34.70	73.27	-32.45	249.0	55.0
TOP LEFT FRONT SEAT Z (LB)	49.55	935.34	-323.05	57.0	353.0
TOP LEFT FRONT SEAT RES (LB)	67.54	1101.59	53.64	109.0	13.0
TOP RIGHT FRONT SEAT X (LB)	49.27	265.62	-927.52	246.0	111.0
TOP RIGHT FRONT SEAT Y (LB)	44.92	100.73	27.28	62.0	344.0
TOP RIGHT FRONT SEAT Z (LB)	43.12	1016.65	-176.51	59.0	375.0
TOP RIGHT FRONT SEAT RES (LB)	79.49	1141.03	61.45	111.0	195.0
BOT LEFT FRONT SEAT X (LB)	-38.33	-7.34	-90.21	414.0	72.0
BOT LEFT FRONT SEAT Y (LB)	-91.23	279.43	-120.52	291.0	95.0
BOT LEFT FRONT SEAT Z (LB)	14.75	36.16	-232.55	18.0	291.0
BOT LEFT FRONT SEAT RES (LB)	100.12	365.39	50.51	291.0	355.0
BOT RIGHT FRONT SEAT X (LB)	41.56	75.21	-8.47	281.0	88.0
BOT RIGHT FRONT SEAT Y (LB)	8.26	58.37	-340.84	52.0	299.0
BOT RIGHT FRONT SEAT Z (LB)	-2.86	44.67	-383.14	102.0	299.0
BOT RIGHT FRONT SEAT RES (LB)	42.70	515.53	21.18	299.0	31.0
BOT LEFT REAR SEAT X (LB)	-46.59	217.51	-1329.00	191.0	103.0
BOT LEFT REAR SEAT Y (LB)	-34.02	211.90	-132.83	75.0	282.0
BOT LEFT REAR SEAT Z (LB)	-19.14	452.24	-1165.74	281.0	82.0
BOT LEFT REAR SEAT RES (LB)	60.92	1719.64	55.10	101.0	2.0



BOT RIGHT REAR SEAT X (LB)	55.42	331.47	-1216.70	200.0	105.0
BOT RIGHT REAR SEAT Y (LB)	-39.46	28.41	-352.49	177.0	81.0
BOT RIGHT REAR SEAT Z (LB)	-9.45	256.65	-1285.18	276.0	63.0
BOT RIGHT REAR SEAT RES (LB)	68.83	1409.34	63.28	83.0	13.0
LEFT SHOULDER FORCE (LB)	14.21	1072.41	0.60	120.0	200.0
RIGHT SHOULDER FORCE (LB)	13.18	992.28	1.14	118.0	420.0
LEFT LAP FORCE (LB)	16.83	820.98	9.29	86.0	210.0
RIGHT LAP FORCE (LB)	10.91	619.81	4.08	85.0	195.0
INT HEAD X ACCEL (G)	0.00	36.27	-23.72	247.0	127.0
INT HEAD Y ACCEL (G)	0.00	1.33	-2.00	115.0	249.0
INT HEAD Z ACCEL (G)	1.00	5.70	-27.91	252.0	122.0
INT HEAD RESULTANT (G)	1.00	36.37	0.48	247.0	29.0
INT HEAD HIC		99.50		118.0	133.0
INT HEAD Ry ANG ACC (RAD/S2)	-0.16	3072.88	-2691.36	245.0	138.0
INT NECK X FORCE (LB)	3.98	22.72	-300.13	247.0	128.0
INT NECK Y FORCE (LB)	-6.12	26.56	-15.38	139.0	91.0
INT NECK Z FORCE (LB)	-13.38	476.51	-74.24	246.0	287.0
INT NECK FORCE RES (LB)	15.24	477.33	6.33	246.0	32.0
INT NECK Mx TORQUE (IN-LB)	9.21	75.76	-93.36	164.0	265.0
INT NECK My TORQUE (IN-LB)	-11.32	1002.17	-185.75	159.0	325.0
INT NECK Mz TORQUE (IN-LB)	-8.43	44.00	-16.15	157.0	447.0
INT NECK TORQUE RES (IN-LB)	16.86	1005.19	14.12	159.0	286.0
INT CHEST X ACCEL (G)	0.01	5.19	-22.64	236.0	104.0
INT CHEST Y ACCEL (G)	0.00	1.66	-3.88	265.0	85.0
INT CHEST Z ACCEL (G)	1.02	9.63	-6.71	139.0	96.0
INT CHEST RESULTANT (G)	1.02	23.60	0.06	103.0	418.0
INT CHEST Ry ANG ACC (RAD/S2)	0.38	427.95	-593.21	273.0	138.0
INT LUMBAR X ACCEL (G)	0.00	15.32	-29.50	169.0	99.0
INT LUMBAR Y ACCEL (G)	0.01	12.57	-17.29	136.0	143.0
INT LUMBAR Z ACCEL (G)	1.00	16.34	-4.27	111.0	274.0
INT LUMBAR RESULTANT (G)	1.00	32.06	0.27	101.0	428.0
INT LUMBAR X FORCE (LB)	4.62	316.85	-285.75	129.0	85.0
INT LUMBAR Y FORCE (LB)	-7.10	35.52	-21.50	172.0	99.0
INT LUMBAR Z FORCE (LB)	-19.22	324.95	-194.26	78.0	112.0
INT LUMBAR FORCE RES (LB)	21.01	410.40	4.61	80.0	278.0
INT LUMBAR Mx TORQUE (IN-LB)	-32.43	127.77	-191.36	139.0	99.0
INT LUMBAR My TORQUE (IN-LB)	128.96	1837.69	-709.15	87.0	131.0
INT LUMBAR Mz TORQUE (IN-LB)	-11.87	21.70	-114.72	300.0	161.0
INT LUMBAR TORQUE RES (IN-LB)	133.51	1840.73	110.70	87.0	258.0
NIJ SHEAR (LB)		22.72	-300.13	247.0	128.0

NIJ TENSION (LB)		476.51		246.0	
NIJ COMPRESSION (LB)		-74.24		287.0	
NIJ FLEXION (IN-LB)		1094.12		159.0	
NIJ EXTENSION (IN-LB)		185.98		325.0	
NIJ NTF	0.0000	0.4435	0.0000	159.0	0.0
NIJ NTE	0.0000	0.2370	0.0000	249.0	0.0
NIJ NCF	0.0000	0.1344	0.0000	270.0	0.0
NIJ NCE	0.0215	0.0990	0.0000	281.0	32.0
NIJ NTF AIS >= 2		0.18			
NIJ NTF AIS >= 3		0.09			
NIJ NTF AIS >= 4		0.10			
NIJ NTF AIS >= 5		0.04			
NIJ NTE AIS >= 2		0.15			
NIJ NTE AIS >= 3		0.06			
NIJ NTE AIS >= 4		0.08			
NIJ NTE AIS >= 5		0.03			
NIJ NCF AIS >= 2		0.13			
NIJ NCF AIS >= 3		0.05			
NIJ NCF AIS >= 4		0.07			
NIJ NCF AIS >= 5		0.03			
NIJ NCE AIS >= 2		0.13			
NIJ NCE AIS >= 3		0.05			
NIJ NCE AIS >= 4		0.07			
NIJ NCE AIS >= 5		0.02			
MNIx	0.0077	0.0781	0.0005	265.0	326.0
NMIz	0.0071	0.0368	0.0000	157.0	114.0

201204 Test: 8706 Test Date: 130220 Subj: AERO50 Wt: 165.0  
 Nom G: 18.0 Cell: V

Data ID	Immediate Preimpact	Maximum Value	Minimum Value	Time Of Maximum	Time Of Minimum
Reference Mark Time (Ms)				-167.0	
Impact Rise Time (Ms)				72.0	
Impact Duration (Ms)				123.0	
Velocity Change (Ft/Sec)		46.40			
SLED X ACCEL (G)	0.00	18.01	-1.62	72.0	127.0
SLED Y ACCEL (G)	0.00	0.72	-1.26	27.0	33.0
SLED Z ACCEL (G)	1.00	4.16	-0.28	25.0	51.0
SLED VELOCITY (FT/SEC)	0.18	44.66	0.20	133.0	0.0
INTEGRATED ACCEL (FT/SEC)	0.01	46.40	0.02	122.0	0.0
SEAT FIXTURE X ACCEL (G)	0.01	21.18	-2.76	63.0	162.0
SEAT FIXTURE Y ACCEL (G)	0.00	1.94	-4.41	204.0	51.0
SEAT FIXTURE Z ACCEL (G)	1.00	6.91	-4.86	26.0	33.0
SEAT FIXTURE DRX	0.03	25.88	-12.14	71.0	150.0
SEAT PAN X ACCEL (G)	-0.01	17.57	-46.78	148.0	105.0
SEAT PAN Y ACCEL (G)	0.00	10.96	-6.12	76.0	63.0
SEAT PAN Z ACCEL (G)	1.01	11.85	-13.79	149.0	141.0
SEAT PAN DRX	-0.01	19.91	-28.89	177.0	77.0
TOP LEFT FRONT SEAT X (LB)	9.53	148.62	-930.16	269.0	115.0
TOP LEFT FRONT SEAT Y (LB)	27.85	72.40	-29.47	394.0	51.0
TOP LEFT FRONT SEAT Z (LB)	93.38	834.34	-450.86	55.0	338.0
TOP LEFT FRONT SEAT RES (LB)	98.01	992.71	80.58	109.0	13.0
TOP RIGHT FRONT SEAT X (LB)	34.47	194.00	-859.63	270.0	109.0
TOP RIGHT FRONT SEAT Y (LB)	34.77	81.66	5.74	61.0	238.0
TOP RIGHT FRONT SEAT Z (LB)	81.70	884.42	-386.29	60.0	357.0
TOP RIGHT FRONT SEAT RES (LB)	95.28	1006.20	83.03	62.0	15.0
BOT LEFT FRONT SEAT X (LB)	-28.36	-7.09	-77.99	274.0	73.0
BOT LEFT FRONT SEAT Y (LB)	-57.54	396.80	-71.85	294.0	26.0
BOT LEFT FRONT SEAT Z (LB)	0.17	9.36	-310.01	15.0	295.0
BOT LEFT FRONT SEAT RES (LB)	64.19	503.08	39.02	294.0	382.0
BOT RIGHT FRONT SEAT X (LB)	30.50	42.32	-16.28	272.0	68.0
BOT RIGHT FRONT SEAT Y (LB)	8.57	21.19	-403.81	14.0	296.0
BOT RIGHT FRONT SEAT Z (LB)	-7.22	10.32	-454.07	20.0	294.0
BOT RIGHT FRONT SEAT RES (LB)	32.59	607.97	7.92	294.0	29.0
BOT LEFT REAR SEAT X (LB)	-19.14	250.70	-1235.51	287.0	88.0
BOT LEFT REAR SEAT Y (LB)	-38.48	149.80	-197.78	57.0	291.0
BOT LEFT REAR SEAT Z (LB)	-35.50	713.79	-1108.56	287.0	60.0
BOT LEFT REAR SEAT RES (LB)	55.92	1518.05	51.18	79.0	2.0

BOT RIGHT REAR SEAT X (LB)	37.75	340.25	-1176.19	290.0	91.0
BOT RIGHT REAR SEAT Y (LB)	-27.25	121.52	-279.89	292.0	61.0
BOT RIGHT REAR SEAT Z (LB)	-38.02	558.49	-1111.17	292.0	61.0
BOT RIGHT REAR SEAT RES (LB)	60.19	1359.21	37.05	69.0	10.0
LEFT SHOULDER FORCE (LB)	17.69	838.58	2.99	126.0	412.0
RIGHT SHOULDER FORCE (LB)	19.17	692.41	6.92	102.0	401.0
LEFT LAP FORCE (LB)	-1.38	2.25	-2.00	70.0	358.0
RIGHT LAP FORCE (LB)	3.22	6.06	2.46	40.0	134.0
INT HEAD X ACCEL (G)	-0.02	18.41	-20.67	259.0	129.0
INT HEAD Y ACCEL (G)	0.00	2.46	-6.37	33.0	28.0
INT HEAD Z ACCEL (G)	1.01	1.77	-18.48	264.0	129.0
INT HEAD RESULTANT (G)	1.01	27.73	0.48	129.0	18.0
INT HEAD HIC		51.61		120.0	135.0
INT HEAD Ry ANG ACC (RAD/S2)	-0.44	1354.52	-1411.27	259.0	142.0
INT NECK X FORCE (LB)	5.12	24.36	-143.79	249.0	129.0
INT NECK Y FORCE (LB)	-10.88	-0.31	-41.33	230.0	23.0
INT NECK Z FORCE (LB)	-20.42	338.83	-84.04	129.0	279.0
INT NECK FORCE RES (LB)	23.70	368.96	5.30	129.0	226.0
INT NECK Mx TORQUE (IN-LB)	11.35	150.77	-37.10	43.0	308.0
INT NECK My TORQUE (IN-LB)	-11.12	708.56	-241.74	146.0	33.0
INT NECK Mz TORQUE (IN-LB)	-8.65	9.77	-49.42	194.0	276.0
INT NECK TORQUE RES (IN-LB)	18.10	712.01	17.73	146.0	9.0
INT CHEST X ACCEL (G)	0.00	6.92	-19.59	288.0	115.0
INT CHEST Y ACCEL (G)	0.00	1.49	-3.47	236.0	121.0
INT CHEST Z ACCEL (G)	0.97	9.36	-5.76	114.0	75.0
INT CHEST RESULTANT (G)	0.98	21.52	0.42	115.0	423.0
INT CHEST Ry ANG ACC (RAD/S2)	-0.07	449.03	-476.20	148.0	112.0
INT LUMBAR X ACCEL (G)	-0.02	12.63	-27.65	147.0	85.0
INT LUMBAR Y ACCEL (G)	0.00	3.63	-3.42	93.0	376.0
INT LUMBAR Z ACCEL (G)	1.00	17.94	-3.10	106.0	295.0
INT LUMBAR RESULTANT (G)	1.00	28.59	0.65	85.0	416.0
INT LUMBAR X FORCE (LB)	21.68	206.14	-158.25	172.0	87.0
INT LUMBAR Y FORCE (LB)	-7.26	37.70	-36.61	152.0	381.0
INT LUMBAR Z FORCE (LB)	-31.20	208.43	-307.12	370.0	115.0
INT LUMBAR FORCE RES (LB)	38.69	317.60	10.18	115.0	23.0
INT LUMBAR Mx TORQUE (IN-LB)	-11.27	106.49	-217.51	153.0	115.0
INT LUMBAR My TORQUE (IN-LB)	81.36	1317.28	-432.13	91.0	138.0
INT LUMBAR Mz TORQUE (IN-LB)	-13.13	62.94	-67.30	79.0	396.0
INT LUMBAR TORQUE RES (IN-LB)	83.19	1318.93	45.63	91.0	168.0
NIJ SHEAR (LB)		24.36	-143.79	249.0	129.0

NIJ TENSION (LB)		338.83		129.0	
NIJ COMPRESSION (LB)		-84.04		279.0	
NIJ FLEXION (IN-LB)		781.42		146.0	
NIJ EXTENSION (IN-LB)		194.82		28.0	
NIJ NTF	0.0000	0.4255	0.0000	142.0	0.0
NIJ NTE	0.0000	0.2921	0.0000	31.0	0.0
NIJ NCF	0.0000	0.0803	0.0000	433.0	0.0
NIJ NCE	0.0271	0.1513	0.0000	313.0	19.0
NIJ NTF AIS >= 2		0.18			
NIJ NTF AIS >= 3		0.08			
NIJ NTF AIS >= 4		0.10			
NIJ NTF AIS >= 5		0.04			
NIJ NTE AIS >= 2		0.15			
NIJ NTE AIS >= 3		0.07			
NIJ NTE AIS >= 4		0.09			
NIJ NTE AIS >= 5		0.03			
NIJ NCF AIS >= 2		0.13			
NIJ NCF AIS >= 3		0.05			
NIJ NCF AIS >= 4		0.07			
NIJ NCF AIS >= 5		0.02			
NIJ NCE AIS >= 2		0.13			
NIJ NCE AIS >= 3		0.05			
NIJ NCE AIS >= 4		0.08			
NIJ NCE AIS >= 5		0.03			
MNIx	0.0095	0.1262	0.0003	43.0	209.0
NMIz	0.0072	0.0414	0.0000	276.0	210.0

201204 Test: 8707 Test Date: 130220 Subj: LARD Wt: 242.0  
 Nom G: 24.0 Cell: F

Data ID	Immediate Preimpact	Maximum Value	Minimum Value	Time Of Maximum	Time Of Minimum
Reference Mark Time (Ms)				-211.0	
Impact Rise Time (Ms)				66.0	
Impact Duration (Ms)				102.0	
Velocity Change (Ft/Sec)		53.07			
SLED X ACCEL (G)	0.01	24.79	-1.77	66.0	105.0
SLED Y ACCEL (G)	0.00	0.65	-1.74	148.0	47.0
SLED Z ACCEL (G)	1.00	3.37	-1.67	52.0	47.0
SLED VELOCITY (FT/SEC)	0.19	50.56	0.18	105.0	0.0
INTEGRATED ACCEL (FT/SEC)	0.01	53.07	0.02	101.0	0.0
SEAT FIXTURE X ACCEL (G)	-0.01	31.88	-4.93	42.0	127.0
SEAT FIXTURE Y ACCEL (G)	0.00	2.11	-5.17	131.0	45.0
SEAT FIXTURE Z ACCEL (G)	1.01	8.09	-5.19	23.0	60.0
SEAT FIXTURE DRX	-0.01	38.61	-28.50	68.0	134.0
SEAT PAN X ACCEL (G)	0.00	79.59	-63.20	136.0	151.0
SEAT PAN Y ACCEL (G)	0.00	44.56	-39.53	133.0	123.0
SEAT PAN Z ACCEL (G)	1.00	72.79	-65.11	125.0	148.0
SEAT PAN DRX	-0.04	20.62	-28.39	155.0	84.0
TOP LEFT FRONT SEAT X (LB)	12.43	56.70	-1016.12	378.0	84.0
TOP LEFT FRONT SEAT Y (LB)	27.69	87.12	-39.08	115.0	44.0
TOP LEFT FRONT SEAT Z (LB)	21.28	802.67	-397.13	44.0	277.0
TOP LEFT FRONT SEAT RES (LB)	37.16	1063.03	32.30	84.0	11.0
TOP RIGHT FRONT SEAT X (LB)	29.31	63.35	-988.71	367.0	82.0
TOP RIGHT FRONT SEAT Y (LB)	29.56	115.43	-6.38	112.0	141.0
TOP RIGHT FRONT SEAT Z (LB)	25.88	956.89	-178.01	45.0	220.0
TOP RIGHT FRONT SEAT RES (LB)	49.08	1119.85	29.99	82.0	237.0
BOT LEFT FRONT SEAT X (LB)	-26.47	46.39	-97.29	105.0	12.0
BOT LEFT FRONT SEAT Y (LB)	-78.41	33.65	-87.37	231.0	26.0
BOT LEFT FRONT SEAT Z (LB)	15.42	184.57	2.49	105.0	260.0
BOT LEFT FRONT SEAT RES (LB)	84.22	191.65	28.99	105.0	335.0
BOT RIGHT FRONT SEAT X (LB)	29.05	44.93	-35.81	116.0	64.0
BOT RIGHT FRONT SEAT Y (LB)	28.69	41.09	-34.67	13.0	106.0
BOT RIGHT FRONT SEAT Z (LB)	17.66	100.62	10.96	106.0	27.0
BOT RIGHT FRONT SEAT RES (LB)	44.58	115.02	23.50	106.0	27.0
BOT LEFT REAR SEAT X (LB)	-20.00	161.99	-2051.25	116.0	78.0
BOT LEFT REAR SEAT Y (LB)	-66.20	294.32	-175.68	73.0	116.0
BOT LEFT REAR SEAT Z (LB)	46.06	497.41	-1487.08	116.0	70.0
BOT LEFT REAR SEAT RES (LB)	83.13	2485.24	67.42	76.0	8.0

BOT RIGHT REAR SEAT X (LB)	35.19	318.66	-1970.06	389.0	77.0
BOT RIGHT REAR SEAT Y (LB)	4.03	85.96	-340.61	377.0	86.0
BOT RIGHT REAR SEAT Z (LB)	24.13	111.56	-1518.68	387.0	58.0
BOT RIGHT REAR SEAT RES (LB)	42.89	2466.77	18.48	76.0	7.0
LEFT SHOULDER FORCE (LB)	13.14	880.02	0.60	89.0	384.0
RIGHT SHOULDER FORCE (LB)	18.71	1688.00	18.36	143.0	6.0
LEFT LAP FORCE (LB)	18.39	1129.43	17.72	79.0	2.0
RIGHT LAP FORCE (LB)	12.22	1965.57	5.16	152.0	124.0
INT HEAD X ACCEL (G)	0.01	33.08	-27.74	211.0	130.0
INT HEAD Y ACCEL (G)	-0.01	9.57	-9.54	118.0	204.0
INT HEAD Z ACCEL (G)	0.99	2.27	-26.20	230.0	129.0
INT HEAD RESULTANT (G)	0.99	38.09	0.27	130.0	26.0
INT HEAD HIC		66.13		124.0	139.0
INT HEAD Ry ANG ACC (RAD/S2)	1.05	2349.40	-2506.38	208.0	136.0
INT NECK X FORCE (LB)	3.77	4.39	-534.64	2.0	137.0
INT NECK Y FORCE (LB)	7.22	145.40	-67.16	142.0	199.0
INT NECK Z FORCE (LB)	-9.62	471.72	-103.02	133.0	228.0
INT NECK FORCE RES (LB)	12.61	705.08	7.88	134.0	24.0
INT NECK Mx TORQUE (IN-LB)	9.77	256.16	-359.65	218.0	126.0
INT NECK My TORQUE (IN-LB)	-7.61	3172.52	-533.97	237.0	261.0
INT NECK Mz TORQUE (IN-LB)	-5.81	74.34	-222.90	150.0	232.0
INT NECK TORQUE RES (IN-LB)	13.69	3180.16	6.17	237.0	58.0
INT CHEST X ACCEL (G)	0.00	3.76	-54.83	382.0	143.0
INT CHEST Y ACCEL (G)	0.00	4.83	-5.96	108.0	156.0
INT CHEST Z ACCEL (G)	1.00	14.26	-13.67	157.0	57.0
INT CHEST RESULTANT (G)	1.00	54.97	0.76	143.0	375.0
INT CHEST Ry ANG ACC (RAD/S2)	-0.30	374.74	-1086.25	83.0	125.0
INT LUMBAR X ACCEL (G)	-0.01	9.04	-30.24	164.0	71.0
INT LUMBAR Y ACCEL (G)	0.01	22.93	-12.42	148.0	135.0
INT LUMBAR Z ACCEL (G)	1.00	18.52	-4.86	152.0	119.0
INT LUMBAR RESULTANT (G)	1.00	33.35	0.25	69.0	360.0
INT LUMBAR X FORCE (LB)	-40.11	518.19	-204.74	79.0	156.0
INT LUMBAR Y FORCE (LB)	7.55	254.98	-117.10	137.0	80.0
INT LUMBAR Z FORCE (LB)	-36.17	493.79	-82.34	74.0	155.0
INT LUMBAR FORCE RES (LB)	54.54	706.73	13.51	77.0	29.0
INT LUMBAR Mx TORQUE (IN-LB)	-14.48	685.81	-1450.15	80.0	144.0
INT LUMBAR My TORQUE (IN-LB)	-51.93	617.78	-2635.74	156.0	80.0
INT LUMBAR Mz TORQUE (IN-LB)	-9.08	69.64	-19.90	158.0	81.0
INT LUMBAR TORQUE RES (IN-LB)	54.68	2723.57	54.43	80.0	0.0
NIJ SHEAR (LB)		4.47	-534.64	-209.0	137.0

NIJ TENSION (LB)		471.72		133.0	
NIJ COMPRESSION (LB)		-103.02		228.0	
NIJ FLEXION (IN-LB)		3305.01		398.0	
NIJ EXTENSION (IN-LB)		450.23		261.0	
NIJ NTF	0.0000	0.9021	0.0000	274.0	0.0
NIJ NTE	0.0000	0.2901	0.0000	261.0	0.0
NIJ NCF	0.0000	0.9125	0.0000	237.0	0.0
NIJ NCE	0.0122	0.1861	0.0000	388.0	25.0
NIJ NTF AIS >= 2		0.27			
NIJ NTF AIS >= 3		0.19			
NIJ NTF AIS >= 4		0.17			
NIJ NTF AIS >= 5		0.06			
NIJ NTE AIS >= 2		0.15			
NIJ NTE AIS >= 3		0.07			
NIJ NTE AIS >= 4		0.09			
NIJ NTE AIS >= 5		0.03			
NIJ NCF AIS >= 2		0.28			
NIJ NCF AIS >= 3		0.20			
NIJ NCF AIS >= 4		0.17			
NIJ NCF AIS >= 5		0.06			
NIJ NCE AIS >= 2		0.14			
NIJ NCE AIS >= 3		0.05			
NIJ NCE AIS >= 4		0.08			
NIJ NCE AIS >= 5		0.03			
MNIx	0.0062	0.2271	0.0001	126.0	57.0
NMIz	0.0037	0.1407	0.0001	232.0	360.0



201204 Test: 8711 Test Date: 130226 Subj: AERO50 Wt: 165.0  
 Nom G: 18.0 Cell: S

Data ID	Immediate Preimpact	Maximum Value	Minimum Value	Time Of Maximum	Time Of Minimum
Reference Mark Time (Ms)				-217.0	
Impact Rise Time (Ms)				71.0	
Impact Duration (Ms)				126.0	
Velocity Change (Ft/Sec)		46.52			
SLED X ACCEL (G)	0.02	17.54	-0.77	71.0	185.0
SLED Y ACCEL (G)	0.00	0.75	-1.81	193.0	49.0
SLED Z ACCEL (G)	1.00	3.08	-0.31	25.0	157.0
SLED VELOCITY (FT/SEC)	0.19	45.10	0.20	211.0	2.0
INTEGRATED ACCEL (FT/SEC)	0.01	46.52	0.03	125.0	0.0
SEAT FIXTURE X ACCEL (G)	0.00	20.26	-6.43	46.0	149.0
SEAT FIXTURE Y ACCEL (G)	-0.01	1.69	-4.90	179.0	28.0
SEAT FIXTURE Z ACCEL (G)	1.00	5.12	-3.26	25.0	32.0
SEAT FIXTURE DRX	0.02	25.17	-9.82	71.0	156.0
SEAT PAN X ACCEL (G)	-0.01	51.48	-44.69	53.0	83.0
SEAT PAN Y ACCEL (G)	0.00	6.68	-8.83	169.0	86.0
SEAT PAN Z ACCEL (G)	1.00	7.02	-2.46	53.0	26.0
SEAT PAN DRX	0.00	32.96	-36.85	163.0	111.0
TOP LEFT FRONT SEAT X (LB)	19.85	331.71	-899.33	163.0	84.0
TOP LEFT FRONT SEAT Y (LB)	12.94	92.26	-262.06	208.0	162.0
TOP LEFT FRONT SEAT Z (LB)	41.66	479.34	-1418.58	168.0	78.0
TOP LEFT FRONT SEAT RES (LB)	48.02	1660.66	27.60	78.0	10.0
TOP RIGHT FRONT SEAT X (LB)	39.46	309.56	-801.32	172.0	79.0
TOP RIGHT FRONT SEAT Y (LB)	39.95	258.90	-142.84	169.0	18.0
TOP RIGHT FRONT SEAT Z (LB)	63.91	595.65	-847.53	162.0	85.0
TOP RIGHT FRONT SEAT RES (LB)	85.13	1150.80	46.20	85.0	10.0
BOT LEFT FRONT SEAT X (LB)	-28.87	56.69	-856.82	169.0	83.0
BOT LEFT FRONT SEAT Y (LB)	-31.33	97.70	-458.11	16.0	89.0
BOT LEFT FRONT SEAT Z (LB)	-9.93	1696.83	-382.89	89.0	167.0
BOT LEFT FRONT SEAT RES (LB)	43.84	1949.97	40.31	89.0	0.0
BOT RIGHT FRONT SEAT X (LB)	28.32	165.39	-601.66	169.0	82.0
BOT RIGHT FRONT SEAT Y (LB)	-15.90	424.30	-198.99	83.0	163.0
BOT RIGHT FRONT SEAT Z (LB)	-7.91	2801.57	-865.49	83.0	164.0
BOT RIGHT FRONT SEAT RES (LB)	33.51	2895.75	25.97	83.0	3.0
BOT LEFT REAR SEAT X (LB)	-26.23	355.48	-2579.65	167.0	83.0
BOT LEFT REAR SEAT Y (LB)	-27.71	242.50	-57.06	153.0	177.0
BOT LEFT REAR SEAT Z (LB)	-23.58	59.69	-1284.38	167.0	77.0
BOT LEFT REAR SEAT RES (LB)	44.92	2792.50	46.43	83.0	1.0

BOT RIGHT REAR SEAT X (LB)	34.96	749.63	-2781.08	169.0	81.0
BOT RIGHT REAR SEAT Y (LB)	-29.35	256.56	-228.13	170.0	157.0
BOT RIGHT REAR SEAT Z (LB)	0.62	459.75	-1469.54	162.0	84.0
BOT RIGHT REAR SEAT RES (LB)	45.81	3112.30	31.35	83.0	4.0
LEFT SHOULDER FORCE (LB)	14.46	709.35	14.36	82.0	1.0
RIGHT SHOULDER FORCE (LB)	9.45	585.74	8.91	75.0	1.0
LEFT LAP FORCE (LB)	7.94	793.73	7.65	86.0	1.0
RIGHT LAP FORCE (LB)	8.40	684.60	1.74	88.0	256.0
INT HEAD X ACCEL (G)	0.00	17.49	-19.19	228.0	94.0
INT HEAD Y ACCEL (G)	0.01	4.88	-2.61	220.0	239.0
INT HEAD Z ACCEL (G)	1.00	17.79	-19.09	162.0	75.0
INT HEAD RESULTANT (G)	1.00	23.96	0.36	75.0	325.0
INT HEAD HIC		34.08		69.0	84.0
INT HEAD Ry ANG ACC (RAD/S2)	3.30	2678.22	-707.41	30.0	184.0
INT NECK X FORCE (LB)	2.28	82.60	-140.05	167.0	89.0
INT NECK Y FORCE (LB)	-4.01	17.32	-15.22	236.0	37.0
INT NECK Z FORCE (LB)	-17.82	337.35	-182.30	75.0	162.0
INT NECK FORCE RES (LB)	18.41	350.08	9.52	75.0	20.0
INT NECK Mx TORQUE (IN-LB)	10.57	180.33	-36.01	95.0	49.0
INT NECK My TORQUE (IN-LB)	-9.83	536.08	-323.66	106.0	196.0
INT NECK Mz TORQUE (IN-LB)	-7.65	49.31	-47.66	248.0	99.0
LOWER NECK DISPLACEMENT (IN)	0.01	3.89	-0.83	96.0	298.0
INT NECK TORQUE RES (IN-LB)	16.35	540.57	12.12	105.0	45.0
INT CHEST X ACCEL (G)	0.01	24.61	-26.07	161.0	75.0
INT CHEST Y ACCEL (G)	0.00	3.88	-5.92	163.0	97.0
INT CHEST Z ACCEL (G)	0.99	11.97	-6.92	90.0	109.0
INT CHEST RESULTANT (G)	0.99	26.23	0.25	75.0	329.0
INT CHEST Ry ANG ACC (RAD/S2)	-0.12	1243.00	-633.25	160.0	168.0
INT LUMBAR X ACCEL (G)	0.00	3.97	-36.21	217.0	85.0
INT LUMBAR Y ACCEL (G)	-0.01	4.23	-4.76	58.0	87.0
INT LUMBAR Z ACCEL (G)	1.00	18.91	-6.83	82.0	163.0
INT LUMBAR RESULTANT (G)	1.00	40.84	0.20	83.0	337.0
INT LUMBAR X FORCE (LB)	11.79	231.12	-79.98	129.0	229.0
INT LUMBAR Y FORCE (LB)	-7.73	17.04	-118.31	21.0	77.0
INT LUMBAR Z FORCE (LB)	-15.68	110.84	-1148.34	110.0	90.0
INT LUMBAR FORCE RES (LB)	21.09	1168.12	21.03	90.0	3.0
INT LUMBAR Mx TORQUE (IN-LB)	43.91	85.48	-571.47	204.0	78.0
INT LUMBAR My TORQUE (IN-LB)	116.26	942.98	-1409.79	173.0	91.0
INT LUMBAR Mz TORQUE (IN-LB)	-0.69	112.11	-2.39	76.0	15.0
INT LUMBAR TORQUE RES (IN-LB)	124.28	1425.68	29.99	91.0	302.0

NIJ SHEAR (LB)		82.60	-140.05	167.0	89.0
NIJ TENSION (LB)		337.35		75.0	
NIJ COMPRESSION (LB)		-182.30		162.0	
NIJ FLEXION (IN-LB)		577.82		105.0	
NIJ EXTENSION (IN-LB)		323.20		196.0	
NIJ NTF	0.0000	0.3963	0.0000	108.0	0.0
NIJ NTE	0.0000	0.3186	0.0000	194.0	0.0
NIJ NCF	0.0000	0.2610	0.0000	164.0	0.0
NIJ NCE	0.0224	0.2007	0.0000	251.0	20.0
NIJ NTF AIS >= 2		0.17			
NIJ NTF AIS >= 3		0.08			
NIJ NTF AIS >= 4		0.10			
NIJ NTF AIS >= 5		0.03			
NIJ NTE AIS >= 2		0.16			
NIJ NTE AIS >= 3		0.07			
NIJ NTE AIS >= 4		0.09			
NIJ NTE AIS >= 5		0.03			
NIJ NCF AIS >= 2		0.15			
NIJ NCF AIS >= 3		0.06			
NIJ NCF AIS >= 4		0.08			
NIJ NCF AIS >= 5		0.03			
NIJ NCE AIS >= 2		0.14			
NIJ NCE AIS >= 3		0.06			
NIJ NCE AIS >= 4		0.08			
NIJ NCE AIS >= 5		0.03			
MNIx	0.0088	0.1509	0.0003	95.0	226.0
NMIz	0.0064	0.0413	0.0001	248.0	196.0

201204 Test: 8712 Test Date: 130226 Subj: AERO50 Wt: 165.0  
 Nom G: 24.0 Cell: T

Data ID	Immediate Preimpact	Maximum Value	Minimum Value	Time Of Maximum	Time Of Minimum
Reference Mark Time (Ms)				-240.0	
Impact Rise Time (Ms)				66.0	
Impact Duration (Ms)				104.0	
Velocity Change (Ft/Sec)		52.89			
SLED X ACCEL (G)	0.01	23.81	-0.94	66.0	170.0
SLED Y ACCEL (G)	0.00	1.21	-2.56	51.0	45.0
SLED Z ACCEL (G)	1.00	3.58	-1.47	50.0	45.0
SLED VELOCITY (FT/SEC)	0.19	52.09	0.17	214.0	0.0
INTEGRATED ACCEL (FT/SEC)	0.04	52.89	0.06	104.0	0.0
SEAT FIXTURE X ACCEL (G)	0.01	29.64	-8.35	56.0	151.0
SEAT FIXTURE Y ACCEL (G)	0.01	2.96	-5.36	203.0	80.0
SEAT FIXTURE Z ACCEL (G)	1.00	273.23	-29.77	48.0	131.0
SEAT FIXTURE DRX	0.00	37.11	-24.95	68.0	135.0
SEAT PAN X ACCEL (G)	-0.01	48.96	-65.17	44.0	71.0
SEAT PAN Y ACCEL (G)	0.00	6.91	-6.33	70.0	18.0
SEAT PAN Z ACCEL (G)	1.00	125.98	-15.45	72.0	127.0
SEAT PAN DRX	-0.01	45.26	-50.11	147.0	96.0
TOP LEFT FRONT SEAT X (LB)	20.18	393.59	-1217.90	146.0	60.0
TOP LEFT FRONT SEAT Y (LB)	13.28	140.93	-231.26	24.0	17.0
TOP LEFT FRONT SEAT Z (LB)	42.13	304.46	-2227.73	145.0	62.0
TOP LEFT FRONT SEAT RES (LB)	48.64	2530.75	14.24	62.0	7.0
TOP RIGHT FRONT SEAT X (LB)	33.55	393.08	-1118.52	147.0	59.0
TOP RIGHT FRONT SEAT Y (LB)	37.31	284.43	-214.91	144.0	17.0
TOP RIGHT FRONT SEAT Z (LB)	64.27	416.28	-1251.42	105.0	63.0
TOP RIGHT FRONT SEAT RES (LB)	81.57	1667.99	47.27	63.0	8.0
BOT LEFT FRONT SEAT X (LB)	-26.66	110.80	-1011.98	156.0	76.0
BOT LEFT FRONT SEAT Y (LB)	-28.37	199.93	-399.86	14.0	74.0
BOT LEFT FRONT SEAT Z (LB)	-15.37	2125.93	-420.20	74.0	146.0
BOT LEFT FRONT SEAT RES (LB)	41.92	2385.76	40.76	74.0	0.0
BOT RIGHT FRONT SEAT X (LB)	27.57	187.52	-797.62	152.0	61.0
BOT RIGHT FRONT SEAT Y (LB)	-18.57	767.08	-167.54	61.0	150.0
BOT RIGHT FRONT SEAT Z (LB)	-14.44	4184.48	-962.92	69.0	150.0
BOT RIGHT FRONT SEAT RES (LB)	36.37	4321.79	26.64	69.0	3.0
BOT LEFT REAR SEAT X (LB)	-21.81	489.81	-3267.32	153.0	68.0
BOT LEFT REAR SEAT Y (LB)	-28.38	129.02	-130.97	129.0	58.0
BOT LEFT REAR SEAT Z (LB)	-20.93	401.76	-1738.60	152.0	62.0
BOT LEFT REAR SEAT RES (LB)	41.54	3654.73	26.32	61.0	178.0

BOT RIGHT REAR SEAT X (LB)	35.81	867.78	-3865.51	151.0	60.0
BOT RIGHT REAR SEAT Y (LB)	-22.45	286.34	-354.21	24.0	17.0
BOT RIGHT REAR SEAT Z (LB)	6.82	580.98	-1679.10	154.0	78.0
BOT RIGHT REAR SEAT RES (LB)	42.93	4128.82	7.17	64.0	343.0
LEFT SHOULDER FORCE (LB)	9.62	945.23	9.57	61.0	0.0
RIGHT SHOULDER FORCE (LB)	15.08	842.99	14.39	62.0	1.0
LEFT LAP FORCE (LB)	17.20	1035.65	17.00	70.0	1.0
RIGHT LAP FORCE (LB)	13.01	972.82	8.64	72.0	295.0
INT HEAD X ACCEL (G)	0.00	24.92	-29.06	210.0	79.0
INT HEAD Y ACCEL (G)	0.01	4.09	-5.27	88.0	197.0
INT HEAD Z ACCEL (G)	1.00	20.86	-32.08	145.0	60.0
INT HEAD RESULTANT (G)	1.00	35.98	0.29	60.0	296.0
INT HEAD HIC		93.88		51.0	66.0
INT HEAD Ry ANG ACC (RAD/S2)	-4.18	3215.34	-3573.29	209.0	148.0
INT NECK X FORCE (LB)	7.14	88.19	-154.88	150.0	59.0
INT NECK Y FORCE (LB)	-9.45	30.91	-19.42	82.0	19.0
INT NECK Z FORCE (LB)	-15.68	505.18	-203.54	61.0	145.0
INT NECK FORCE RES (LB)	19.65	527.77	10.54	61.0	316.0
INT NECK Mx TORQUE (IN-LB)	9.26	72.93	-44.63	73.0	182.0
INT NECK My TORQUE (IN-LB)	-7.47	847.54	-389.26	91.0	178.0
INT NECK Mz TORQUE (IN-LB)	-8.13	27.17	-60.05	91.0	243.0
LOWER NECK DISPLACEMENT (IN)	0.11	5.43	-0.95	93.0	280.0
INT NECK TORQUE RES (IN-LB)	14.46	848.60	14.35	91.0	5.0
INT CHEST X ACCEL (G)	0.01	33.03	-39.11	144.0	56.0
INT CHEST Y ACCEL (G)	0.00	5.68	-8.16	155.0	60.0
INT CHEST Z ACCEL (G)	1.00	22.24	-10.46	76.0	92.0
INT CHEST RESULTANT (G)	1.00	40.32	0.79	57.0	200.0
INT CHEST Ry ANG ACC (RAD/S2)	-0.25	899.05	-666.02	142.0	29.0
INT LUMBAR X ACCEL (G)	0.02	10.84	-52.03	158.0	69.0
INT LUMBAR Y ACCEL (G)	0.00	9.19	-2.48	74.0	24.0
INT LUMBAR Z ACCEL (G)	0.99	30.52	-9.42	71.0	47.0
INT LUMBAR RESULTANT (G)	1.00	60.41	0.76	70.0	272.0
INT LUMBAR X FORCE (LB)	15.68	297.48	-142.55	79.0	56.0
INT LUMBAR Y FORCE (LB)	-8.11	72.50	-30.45	71.0	163.0
INT LUMBAR Z FORCE (LB)	-24.52	134.68	-1580.15	189.0	75.0
INT LUMBAR FORCE RES (LB)	30.22	1602.57	18.12	75.0	204.0
INT LUMBAR Mx TORQUE (IN-LB)	-89.41	305.24	-230.29	74.0	87.0
INT LUMBAR My TORQUE (IN-LB)	-250.55	1054.71	-1850.06	153.0	77.0
INT LUMBAR Mz TORQUE (IN-LB)	-11.84	51.31	-49.65	136.0	71.0
INT LUMBAR TORQUE RES (IN-LB)	266.29	1864.12	29.02	77.0	201.0

NIJ SHEAR (LB)		88.19	-154.88	150.0	59.0
NIJ TENSION (LB)		505.18		61.0	
NIJ COMPRESSION (LB)		-203.54		145.0	
NIJ FLEXION (IN-LB)		853.11		90.0	
NIJ EXTENSION (IN-LB)		392.34		202.0	
NIJ NTF	0.0000	0.5944	0.0000	91.0	0.0
NIJ NTE	0.0000	0.4097	0.0000	177.0	0.0
NIJ NCF	0.0000	0.3052	0.0000	147.0	0.0
NIJ NCE	0.0218	0.3632	0.0000	213.0	17.0
NIJ NTF AIS >= 2		0.21			
NIJ NTF AIS >= 3		0.11			
NIJ NTF AIS >= 4		0.12			
NIJ NTF AIS >= 5		0.04			
NIJ NTE AIS >= 2		0.17			
NIJ NTE AIS >= 3		0.08			
NIJ NTE AIS >= 4		0.10			
NIJ NTE AIS >= 5		0.03			
NIJ NCF AIS >= 2		0.16			
NIJ NCF AIS >= 3		0.07			
NIJ NCF AIS >= 4		0.09			
NIJ NCF AIS >= 5		0.03			
NIJ NCE AIS >= 2		0.17			
NIJ NCE AIS >= 3		0.08			
NIJ NCE AIS >= 4		0.09			
NIJ NCE AIS >= 5		0.03			
MNIx	0.0078	0.0610	0.0001	73.0	224.0
NMIz	0.0068	0.0503	0.0000	243.0	30.0

## 12.0 APPENDIX C – VDT DATA

201204 Test: 6276 Test Date: 121024 Subj: HB50 Wt: 165.0  
Nom G: 16.0 Cell: H

Data ID	Immediate Preimpact	Maximum Value	Minimum Value	Time Of Maximum	Time Of Minimum
Reference Mark Time (Ms)				-138.0	
Impact Rise Time (Ms)				35.5	
Impact Duration (Ms)				121.6	
Velocity Change (Ft/Sec)		31.04			
CARRIAGE X ACCEL (G)	-0.10	4.30	-4.17	48.0	44.0
CARRIAGE Y ACCEL (G)	0.01	1.18	-0.80	16.0	11.0
CARRIAGE Z ACCEL (G)	0.00	15.50	0.43	36.0	0.0
INTEGRATED ACCEL (FT/SEC)	30.48	31.04	1.90	3.0	462.0
SEAT FIXTURE X ACCEL (G)	-0.06	4.17	-5.09	24.0	19.0
SEAT FIXTURE Y ACCEL (G)	-0.04	5.73	-4.54	44.0	35.0
SEAT FIXTURE Z ACCEL (G)	0.00	16.74	0.37	38.0	0.0
SEAT FIXTURE DRZ	0.00	17.98	-3.22	70.0	138.0
SEAT PAN X ACCEL (G)	0.09	20.15	-1.78	36.0	149.0
SEAT PAN Y ACCEL (G)	0.00	4.90	-8.00	95.0	177.0
SEAT PAN Z ACCEL (G)	-0.04	11.87	-7.18	75.0	44.0
SEAT PAN DRZ	0.00	3.19	-4.90	221.0	171.0
TOP LEFT FRONT SEAT X (LB)	-28.73	81.29	-32.65	76.0	8.0
TOP LEFT FRONT SEAT Y (LB)	-35.36	-13.75	-53.04	61.0	247.0
TOP LEFT FRONT SEAT Z (LB)	-33.13	314.41	-432.24	348.0	73.0
TOP LEFT FRONT SEAT RES (LB)	56.40	439.04	56.04	73.0	2.0
TOP RIGHT FRONT SEAT X (LB)	-56.56	36.18	-73.02	77.0	432.0
TOP RIGHT FRONT SEAT Y (LB)	-49.58	141.70	-545.79	196.0	71.0
TOP RIGHT FRONT SEAT Z (LB)	-40.26	-20.32	-81.28	335.0	78.0
TOP RIGHT FRONT SEAT RES (LB)	85.36	551.76	48.61	71.0	115.0
BOT LEFT FRONT SEAT X (LB)	41.58	56.38	24.91	36.0	418.0
BOT LEFT FRONT SEAT Y (LB)	42.99	50.62	15.32	98.0	446.0
BOT LEFT FRONT SEAT Z (LB)	33.17	56.08	-2.49	426.0	36.0
BOT LEFT FRONT SEAT RES (LB)	68.44	74.40	52.86	253.0	39.0
BOT RIGHT FRONT SEAT X (LB)	-42.62	-32.47	-54.34	33.0	20.0
BOT RIGHT FRONT SEAT Y (LB)	32.04	45.63	14.34	181.0	78.0
BOT RIGHT FRONT SEAT Z (LB)	56.43	65.09	19.84	179.0	40.0
BOT RIGHT FRONT SEAT RES (LB)	77.69	90.73	50.12	181.0	33.0
BOT LEFT REAR SEAT X (LB)	42.21	74.90	-82.71	170.0	77.0
BOT LEFT REAR SEAT Y (LB)	-47.28	-35.60	-129.86	167.0	71.0
BOT LEFT REAR SEAT Z (LB)	41.21	60.15	27.90	372.0	45.0

BOT LEFT REAR SEAT RES (LB)	75.65	158.50	66.42	71.0	19.0
BOT RIGHT REAR SEAT X (LB)	-50.39	-23.77	-164.53	83.0	62.0
BOT RIGHT REAR SEAT Y (LB)	38.09	38.75	-24.30	4.0	68.0
BOT RIGHT REAR SEAT Z (LB)	59.22	62.28	-267.60	0.0	67.0
BOT RIGHT REAR SEAT RES (LB)	86.64	313.30	63.82	67.0	16.0
LEFT SHOULDER FORCE (LB)	13.75	110.27	3.54	151.0	341.0
RIGHT SHOULDER FORCE (LB)	17.97	66.55	4.88	177.0	387.0
LEFT LAP FORCE (LB)	16.39	54.67	-0.60	176.0	359.0
RIGHT LAP FORCE (LB)	17.55	37.14	4.11	186.0	442.0
INT HEAD X ACCEL (G)	0.11	4.81	-6.76	75.0	93.0
INT HEAD Y ACCEL (G)	-0.01	1.68	-0.97	67.0	91.0
INT HEAD Z ACCEL (G)	0.04	19.33	-2.69	70.0	150.0
INT HEAD RESULTANT (G)	0.12	19.58	0.11	70.0	0.0
INT HEAD HIC		22.90		68.0	83.0
INT HEAD Ry ANG ACC (RAD/S2)	10.97	883.20	-506.36	60.0	110.0
INT NECK X FORCE (LB)	11.21	69.85	-56.87	69.0	92.0
INT NECK Y FORCE (LB)	-13.51	-3.65	-37.97	134.0	67.0
INT NECK Z FORCE (LB)	-17.65	15.71	-281.67	171.0	79.0
INT NECK FORCE RES (LB)	24.90	283.60	22.49	79.0	226.0
INT NECK Mx TORQUE (IN-LB)	19.56	90.59	-65.47	68.0	88.0
INT NECK My TORQUE (IN-LB)	-26.25	238.65	-88.13	113.0	90.0
INT NECK Mz TORQUE (IN-LB)	-15.12	5.12	-42.52	128.0	81.0
INT NECK TORQUE RES (IN-LB)	36.07	241.38	17.90	113.0	96.0
INT CHEST X ACCEL (G)	-0.02	1.47	-2.04	61.0	36.0
INT CHEST Y ACCEL (G)	0.04	0.83	-0.60	93.0	66.0
INT CHEST Z ACCEL (G)	0.07	21.51	-1.46	71.0	168.0
INT CHEST RESULTANT (G)	0.09	21.53	0.07	71.0	1.0
INT CHEST Ry ANG ACC (RAD/S2)	-0.35	665.46	-300.57	33.0	38.0
INT LUMBAR X ACCEL (G)	-0.01	8.01	-2.15	40.0	87.0
INT LUMBAR Y ACCEL (G)	0.04	1.98	-2.01	80.0	70.0
INT LUMBAR Z ACCEL (G)	0.07	19.42	-2.00	67.0	186.0
INT LUMBAR RESULTANT (G)	0.11	20.27	0.03	67.0	0.0
INT LUMBAR X FORCE (LB)	1.36	603.52	-17.02	81.0	413.0
INT LUMBAR Y FORCE (LB)	-12.77	3.38	-43.50	167.0	71.0
INT LUMBAR Z FORCE (LB)	52.73	97.60	-1206.13	157.0	74.0
INT LUMBAR FORCE RES (LB)	54.27	1338.11	9.03	76.0	342.0
INT LUMBAR Mx TORQUE (IN-LB)	-46.69	16.48	-230.39	136.0	74.0
INT LUMBAR My TORQUE (IN-LB)	59.51	385.44	-2276.07	233.0	80.0
INT LUMBAR Mz TORQUE (IN-LB)	-10.45	44.01	-49.30	437.0	145.0
INT LUMBAR TORQUE RES (IN-LB)	76.42	2280.21	33.07	80.0	115.0



NIJ SHEAR (LB)		69.85	-56.87	69.0	92.0
NIJ TENSION (LB)		15.71		171.0	
NIJ COMPRESSION (LB)		-281.67		79.0	
NIJ FLEXION (IN-LB)		258.86		113.0	
NIJ EXTENSION (IN-LB)		94.98		463.0	
NIJ NTF	0.0000	0.0700	0.0000	138.0	0.0
NIJ NTE	0.0000	0.0000	0.0000	0.0	0.0
NIJ NCF	0.0000	0.2545	0.0000	77.0	0.0
NIJ NCE	0.0413	0.1900	0.0000	54.0	63.0
NIJ NTF AIS >= 2		0.12			
NIJ NTF AIS >= 3		0.04			
NIJ NTF AIS >= 4		0.07			
NIJ NTF AIS >= 5		0.02			
NIJ NTE AIS >= 2		0.11			
NIJ NTE AIS >= 3		0.04			
NIJ NTE AIS >= 4		0.06			
NIJ NTE AIS >= 5		0.02			
NIJ NCF AIS >= 2		0.15			
NIJ NCF AIS >= 3		0.06			
NIJ NCF AIS >= 4		0.08			
NIJ NCF AIS >= 5		0.03			
NIJ NCE AIS >= 2		0.14			
NIJ NCE AIS >= 3		0.05			
NIJ NCE AIS >= 4		0.08			
NIJ NCE AIS >= 5		0.03			
MNIx	0.0164	0.0758	0.0002	68.0	222.0
NMIz	0.0127	0.0356	0.0001	81.0	252.0

201204 Test: 6277 Test Date: 121024 Subj: HB50 Wt: 165.0  
 Nom G: 16.0 Cell: H

Data ID	Immediate Preimpact	Maximum Value	Minimum Value	Time Of Maximum	Time Of Minimum
Reference Mark Time (Ms)				-156.0	
Impact Rise Time (Ms)				35.2	
Impact Duration (Ms)				120.8	
Velocity Change (Ft/Sec)		31.43			
CARRIAGE X ACCEL (G)	0.04	3.68	-2.42	19.0	34.0
CARRIAGE Y ACCEL (G)	0.00	1.49	-0.91	17.0	12.0
CARRIAGE Z ACCEL (G)	0.00	15.57	0.48	35.0	0.0
INTEGRATED ACCEL (FT/SEC)	30.87	31.43	1.73	3.0	444.0
SEAT FIXTURE X ACCEL (G)	0.03	6.26	-7.16	36.0	20.0
SEAT FIXTURE Y ACCEL (G)	0.09	5.28	-6.86	25.0	35.0
SEAT FIXTURE Z ACCEL (G)	0.02	17.10	0.38	39.0	0.0
SEAT FIXTURE DRZ	0.02	18.48	-3.39	70.0	138.0
SEAT PAN X ACCEL (G)	0.03	19.72	-1.91	68.0	149.0
SEAT PAN Y ACCEL (G)	0.01	9.00	-7.71	159.0	177.0
SEAT PAN Z ACCEL (G)	-0.04	12.21	-12.88	69.0	77.0
SEAT PAN DRZ	-0.02	2.74	-4.76	217.0	59.0
TOP LEFT FRONT SEAT X (LB)	-31.40	89.91	-37.30	85.0	11.0
TOP LEFT FRONT SEAT Y (LB)	-35.73	7.20	-42.55	78.0	25.0
TOP LEFT FRONT SEAT Z (LB)	-58.25	44.63	-780.49	390.0	66.0
TOP LEFT FRONT SEAT RES (LB)	75.26	782.57	36.65	66.0	441.0
TOP RIGHT FRONT SEAT X (LB)	-48.60	32.14	-69.64	71.0	398.0
TOP RIGHT FRONT SEAT Y (LB)	-59.21	-59.66	-747.38	3.0	72.0
TOP RIGHT FRONT SEAT Z (LB)	-38.99	-22.77	-79.40	19.0	65.0
TOP RIGHT FRONT SEAT RES (LB)	86.00	751.78	85.03	72.0	3.0
BOT LEFT FRONT SEAT X (LB)	40.42	57.66	26.21	282.0	37.0
BOT LEFT FRONT SEAT Y (LB)	42.64	52.60	33.29	157.0	417.0
BOT LEFT FRONT SEAT Z (LB)	38.99	44.84	-1.87	418.0	33.0
BOT LEFT FRONT SEAT RES (LB)	70.56	80.09	50.12	282.0	37.0
BOT RIGHT FRONT SEAT X (LB)	-39.99	-29.16	-52.35	33.0	38.0
BOT RIGHT FRONT SEAT Y (LB)	40.10	41.71	21.51	7.0	98.0
BOT RIGHT FRONT SEAT Z (LB)	53.09	55.79	15.50	0.0	41.0
BOT RIGHT FRONT SEAT RES (LB)	77.69	80.80	48.48	2.0	60.0
BOT LEFT REAR SEAT X (LB)	43.53	117.22	-138.06	163.0	72.0
BOT LEFT REAR SEAT Y (LB)	-42.33	38.23	-96.22	158.0	73.0
BOT LEFT REAR SEAT Z (LB)	40.44	48.36	20.46	259.0	245.0
BOT LEFT REAR SEAT RES (LB)	73.01	170.59	65.03	72.0	18.0
BOT RIGHT REAR SEAT X (LB)	-43.82	-20.11	-156.58	69.0	38.0

BOT RIGHT REAR SEAT Y (LB)	40.95	44.64	14.44	0.0	43.0
BOT RIGHT REAR SEAT Z (LB)	73.39	75.83	-73.98	0.0	39.0
BOT RIGHT REAR SEAT RES (LB)	94.82	173.51	46.21	38.0	68.0
LEFT SHOULDER FORCE (LB)	5.60	121.08	-3.36	153.0	414.0
RIGHT SHOULDER FORCE (LB)	10.39	34.62	-1.87	148.0	371.0
LEFT LAP FORCE (LB)	14.14	89.00	-3.60	164.0	387.0
RIGHT LAP FORCE (LB)	8.87	91.28	-1.43	167.0	426.0
INT HEAD X ACCEL (G)	0.04	10.70	-6.47	76.0	92.0
INT HEAD Y ACCEL (G)	-0.11	1.75	-1.14	66.0	77.0
INT HEAD Z ACCEL (G)	0.05	20.91	-3.48	81.0	161.0
INT HEAD RESULTANT (G)	0.13	20.92	0.11	81.0	1.0
INT HEAD HIC		26.45		67.0	82.0
INT HEAD Ry ANG ACC (RAD/S2)	0.88	1007.64	-497.19	56.0	107.0
INT NECK X FORCE (LB)	11.67	90.27	-50.28	69.0	95.0
INT NECK Y FORCE (LB)	-7.26	3.34	-22.51	271.0	186.0
INT NECK Z FORCE (LB)	-4.49	41.30	-309.32	161.0	79.0
INT NECK FORCE RES (LB)	14.47	311.57	14.20	79.0	5.0
INT NECK Mx TORQUE (IN-LB)	13.83	50.72	-44.19	66.0	196.0
INT NECK My TORQUE (IN-LB)	-22.11	286.40	-79.26	72.0	399.0
INT NECK Mz TORQUE (IN-LB)	-8.56	15.84	-35.64	245.0	158.0
INT NECK TORQUE RES (IN-LB)	27.46	288.25	16.64	71.0	36.0
INT CHEST X ACCEL (G)	0.06	2.46	-2.00	58.0	167.0
INT CHEST Y ACCEL (G)	0.00	1.65	-0.61	76.0	115.0
INT CHEST Z ACCEL (G)	0.06	21.83	-2.01	68.0	174.0
INT CHEST RESULTANT (G)	0.09	21.83	0.06	68.0	0.0
INT CHEST Ry ANG ACC (RAD/S2)	-0.31	734.90	-262.11	34.0	30.0
INT LUMBAR X ACCEL (G)	0.06	8.51	-0.74	40.0	105.0
INT LUMBAR Y ACCEL (G)	0.02	2.86	-0.98	33.0	46.0
INT LUMBAR Z ACCEL (G)	0.02	20.84	-2.38	60.0	174.0
INT LUMBAR RESULTANT (G)	0.09	21.53	0.01	60.0	1.0
INT LUMBAR X FORCE (LB)	2.59	545.31	-11.02	76.0	363.0
INT LUMBAR Y FORCE (LB)	-8.70	24.40	-77.43	119.0	73.0
INT LUMBAR Z FORCE (LB)	55.60	126.70	-1235.40	161.0	69.0
INT LUMBAR FORCE RES (LB)	56.34	1341.63	7.83	70.0	328.0
INT LUMBAR Mx TORQUE (IN-LB)	-41.86	250.24	-243.61	116.0	72.0
INT LUMBAR My TORQUE (IN-LB)	-202.94	99.83	-2345.11	217.0	74.0
INT LUMBAR Mz TORQUE (IN-LB)	20.17	104.73	-41.00	195.0	119.0
INT LUMBAR TORQUE RES (IN-LB)	208.20	2357.53	42.73	74.0	160.0
NIJ SHEAR (LB)		90.27	-50.28	69.0	95.0
NIJ TENSION (LB)		41.30		161.0	

NIJ COMPRESSION (LB)		-309.32		79.0	
NIJ FLEXION (IN-LB)		233.03		124.0	
NIJ EXTENSION (IN-LB)		96.52		399.0	
NIJ NTF	0.0000	0.0871	0.0000	128.0	0.0
NIJ NTE	0.0000	0.0000	0.0000	0.0	0.0
NIJ NCF	0.0000	0.2851	0.0000	78.0	0.0
NIJ NCE	0.0286	0.1528	0.0000	51.0	57.0
NIJ NTF AIS >= 2		0.12			
NIJ NTF AIS >= 3		0.04			
NIJ NTF AIS >= 4		0.07			
NIJ NTF AIS >= 5		0.02			
NIJ NTE AIS >= 2		0.11			
NIJ NTE AIS >= 3		0.04			
NIJ NTE AIS >= 4		0.06			
NIJ NTE AIS >= 5		0.02			
NIJ NCF AIS >= 2		0.15			
NIJ NCF AIS >= 3		0.07			
NIJ NCF AIS >= 4		0.09			
NIJ NCF AIS >= 5		0.03			
NIJ NCE AIS >= 2		0.13			
NIJ NCE AIS >= 3		0.05			
NIJ NCE AIS >= 4		0.08			
NIJ NCE AIS >= 5		0.03			
MNIx	0.0116	0.0424	0.0000	66.0	353.0
NMIz	0.0072	0.0298	0.0000	158.0	112.0

201204 Test: 6278 Test Date: 121024 Subj: HB50 Wt: 165.0  
 Nom G: 35.0 Cell: J

Data ID	Immediate Preimpact	Maximum Value	Minimum Value	Time Of Maximum	Time Of Minimum
Reference Mark Time (Ms)				-108.0	
Impact Rise Time (Ms)				24.8	
Impact Duration (Ms)				87.5	
Velocity Change (Ft/Sec)		48.63			
CARRIAGE X ACCEL (G)	0.09	4.95	-3.93	32.0	49.0
CARRIAGE Y ACCEL (G)	0.00	1.25	-1.54	11.0	56.0
CARRIAGE Z ACCEL (G)	0.01	34.19	0.48	25.0	0.0
INTEGRATED ACCEL (FT/SEC)	48.08	48.63	2.19	1.0	433.0
SEAT FIXTURE X ACCEL (G)	0.13	5.79	-4.06	60.0	14.0
SEAT FIXTURE Y ACCEL (G)	0.13	4.90	-3.53	34.0	61.0
SEAT FIXTURE Z ACCEL (G)	0.01	39.09	-0.10	26.0	106.0
SEAT FIXTURE DRZ	0.00	38.00	-13.27	59.0	123.0
SEAT PAN X ACCEL (G)	0.06	54.33	-55.60	112.0	100.0
SEAT PAN Y ACCEL (G)	-0.01	13.43	-24.31	55.0	95.0
SEAT PAN Z ACCEL (G)	0.01	52.97	-43.25	95.0	90.0
SEAT PAN DRZ	-0.06	3.04	-13.70	121.0	61.0
TOP LEFT FRONT SEAT X (LB)	-33.28	45.29	-77.26	38.0	212.0
TOP LEFT FRONT SEAT Y (LB)	-37.55	-21.61	-180.06	25.0	64.0
TOP LEFT FRONT SEAT Z (LB)	-6.99	466.81	-329.80	330.0	40.0
TOP LEFT FRONT SEAT RES (LB)	50.74	477.24	49.33	330.0	1.0
TOP RIGHT FRONT SEAT X (LB)	-51.24	39.52	-80.37	40.0	49.0
TOP RIGHT FRONT SEAT Y (LB)	-38.10	152.77	-608.45	265.0	40.0
TOP RIGHT FRONT SEAT Z (LB)	-38.85	-20.93	-73.87	66.0	37.0
TOP RIGHT FRONT SEAT RES (LB)	74.81	613.62	74.26	40.0	1.0
BOT LEFT FRONT SEAT X (LB)	41.77	55.05	16.38	12.0	347.0
BOT LEFT FRONT SEAT Y (LB)	41.12	111.85	39.95	124.0	4.0
BOT LEFT FRONT SEAT Z (LB)	37.63	36.74	-115.83	0.0	25.0
BOT LEFT FRONT SEAT RES (LB)	69.79	163.99	65.32	24.0	2.0
BOT RIGHT FRONT SEAT X (LB)	-40.83	-24.52	-56.99	34.0	18.0
BOT RIGHT FRONT SEAT Y (LB)	36.40	35.19	-38.45	0.0	286.0
BOT RIGHT FRONT SEAT Z (LB)	48.44	48.34	-74.99	1.0	24.0
BOT RIGHT FRONT SEAT RES (LB)	73.13	91.99	28.36	30.0	12.0
BOT LEFT REAR SEAT X (LB)	39.42	121.12	-217.50	227.0	104.0
BOT LEFT REAR SEAT Y (LB)	-52.95	-50.08	-351.24	1.0	111.0
BOT LEFT REAR SEAT Z (LB)	37.44	56.42	19.22	105.0	436.0
BOT LEFT REAR SEAT RES (LB)	75.93	373.79	73.67	111.0	15.0
BOT RIGHT REAR SEAT X (LB)	-42.55	101.13	-275.98	91.0	40.0

BOT RIGHT REAR SEAT Y (LB)	34.57	55.80	-57.77	92.0	40.0
BOT RIGHT REAR SEAT Z (LB)	45.60	44.39	-523.42	1.0	84.0
BOT RIGHT REAR SEAT RES (LB)	71.36	530.02	38.09	84.0	11.0
LEFT SHOULDER FORCE (LB)	15.51	102.52	-5.58	112.0	49.0
RIGHT SHOULDER FORCE (LB)	24.84	58.08	-1.93	111.0	62.0
LEFT LAP FORCE (LB)	24.65	25.44	-4.08	1.0	54.0
RIGHT LAP FORCE (LB)	15.90	68.35	-3.51	36.0	49.0
INT HEAD X ACCEL (G)	0.10	21.47	-36.16	195.0	116.0
INT HEAD Y ACCEL (G)	0.06	2.43	-3.30	229.0	112.0
INT HEAD Z ACCEL (G)	0.11	27.07	-9.14	43.0	189.0
INT HEAD RESULTANT (G)	0.16	36.79	0.10	116.0	3.0
INT HEAD HIC		55.03		113.0	128.0
INT HEAD Ry ANG ACC (RAD/S2)	3.11	1572.65	-2201.08	196.0	126.0
INT NECK X FORCE (LB)	8.66	100.27	-235.76	46.0	127.0
INT NECK Y FORCE (LB)	-9.31	51.86	-23.99	112.0	134.0
INT NECK Z FORCE (LB)	-7.41	119.25	-220.70	199.0	89.0
INT NECK FORCE RES (LB)	14.73	238.36	4.11	127.0	429.0
INT NECK Mx TORQUE (IN-LB)	12.73	144.55	-158.09	295.0	112.0
INT NECK My TORQUE (IN-LB)	-24.21	1071.75	-189.45	125.0	285.0
INT NECK Mz TORQUE (IN-LB)	-10.39	31.88	-51.78	130.0	350.0
INT NECK TORQUE RES (IN-LB)	29.28	1078.50	11.70	125.0	56.0
INT CHEST X ACCEL (G)	0.11	13.91	-17.05	93.0	107.0
INT CHEST Y ACCEL (G)	-0.02	7.90	-7.00	93.0	112.0
INT CHEST Z ACCEL (G)	0.11	41.70	-4.75	109.0	94.0
INT CHEST RESULTANT (G)	0.17	43.30	0.04	109.0	1.0
INT CHEST Ry ANG ACC (RAD/S2)	-1.92	968.96	-1987.11	106.0	92.0
INT LUMBAR X ACCEL (G)	0.15	60.74	-25.40	106.0	112.0
INT LUMBAR Y ACCEL (G)	0.05	11.92	-10.75	50.0	83.0
INT LUMBAR Z ACCEL (G)	0.05	30.84	-17.67	40.0	91.0
INT LUMBAR RESULTANT (G)	0.19	67.85	0.12	106.0	0.0
INT LUMBAR X FORCE (LB)	-9.17	897.67	-30.84	89.0	23.0
INT LUMBAR Y FORCE (LB)	-9.22	215.53	-98.95	111.0	81.0
INT LUMBAR Z FORCE (LB)	40.83	137.33	-1352.52	123.0	44.0
INT LUMBAR FORCE RES (LB)	42.87	1460.46	9.94	44.0	17.0
INT LUMBAR Mx TORQUE (IN-LB)	-46.34	501.64	-640.40	111.0	119.0
INT LUMBAR My TORQUE (IN-LB)	112.02	776.35	-2556.11	206.0	89.0
INT LUMBAR Mz TORQUE (IN-LB)	-29.66	31.44	-154.83	462.0	118.0
INT LUMBAR TORQUE RES (IN-LB)	124.89	2568.81	48.35	89.0	33.0
NIJ SHEAR (LB)		100.27	-235.76	46.0	127.0
NIJ TENSION (LB)		119.25		199.0	

NIJ COMPRESSION (LB)		-220.70		89.0	
NIJ FLEXION (IN-LB)		1232.38		126.0	
NIJ EXTENSION (IN-LB)		154.98		285.0	
NIJ NTF	0.0000	0.4368	0.0000	123.0	0.0
NIJ NTE	0.0000	0.2027	0.0000	199.0	0.0
NIJ NCF	0.0000	0.4717	0.0000	126.0	0.0
NIJ NCE	0.0307	0.1976	0.0000	281.0	31.0
NIJ NTF AIS >= 2		0.18			
NIJ NTF AIS >= 3		0.09			
NIJ NTF AIS >= 4		0.10			
NIJ NTF AIS >= 5		0.04			
NIJ NTE AIS >= 2		0.14			
NIJ NTE AIS >= 3		0.06			
NIJ NTE AIS >= 4		0.08			
NIJ NTE AIS >= 5		0.03			
NIJ NCF AIS >= 2		0.18			
NIJ NCF AIS >= 3		0.09			
NIJ NCF AIS >= 4		0.11			
NIJ NCF AIS >= 5		0.04			
NIJ NCE AIS >= 2		0.14			
NIJ NCE AIS >= 3		0.06			
NIJ NCE AIS >= 4		0.08			
NIJ NCE AIS >= 5		0.03			
MNIx	0.0107	0.1323	0.0000	112.0	404.0
NMIz	0.0087	0.0433	0.0000	350.0	66.0

201204 Test: 6279 Test Date: 121025 Subj: HB50 Wt: 165.0  
 Nom G: 35.0 Cell: K

Data ID	Immediate Preimpact	Maximum Value	Minimum Value	Time Of Maximum	Time Of Minimum
Reference Mark Time (Ms)				-109.0	
Impact Rise Time (Ms)				28.7	
Impact Duration (Ms)				88.8	
Velocity Change (Ft/Sec)		48.61			
CARRIAGE X ACCEL (G)	0.07	9.48	-5.87	32.0	36.0
CARRIAGE Y ACCEL (G)	-0.03	0.92	-1.14	30.0	55.0
CARRIAGE Z ACCEL (G)	0.02	30.64	0.28	22.0	0.0
INTEGRATED ACCEL (FT/SEC)	48.04	48.61	3.23	2.0	425.0
SEAT FIXTURE X ACCEL (G)	0.23	6.11	-5.47	51.0	17.0
SEAT FIXTURE Y ACCEL (G)	-0.06	16.23	-6.89	37.0	31.0
SEAT FIXTURE Z ACCEL (G)	0.05	35.98	0.18	25.0	0.0
SEAT FIXTURE DRZ	0.01	37.71	-12.84	60.0	123.0
SEAT PAN X ACCEL (G)	0.01	34.15	-0.61	32.0	265.0
SEAT PAN Y ACCEL (G)	-0.02	22.74	-42.41	56.0	50.0
SEAT PAN Z ACCEL (G)	-0.10	13.32	-31.27	50.0	45.0
SEAT PAN DRZ	-0.06	1.39	-12.38	151.0	68.0
TOP LEFT FRONT SEAT X (LB)	-20.59	145.97	-29.33	37.0	196.0
TOP LEFT FRONT SEAT Y (LB)	-33.13	1.96	-80.56	30.0	476.0
TOP LEFT FRONT SEAT Z (LB)	-32.83	336.21	-564.48	284.0	45.0
TOP LEFT FRONT SEAT RES (LB)	51.05	567.42	52.29	45.0	2.0
TOP RIGHT FRONT SEAT X (LB)	-51.09	109.92	-67.70	33.0	229.0
TOP RIGHT FRONT SEAT Y (LB)	-50.09	249.45	-546.83	236.0	42.0
TOP RIGHT FRONT SEAT Z (LB)	-37.76	-17.86	-96.09	326.0	40.0
TOP RIGHT FRONT SEAT RES (LB)	80.96	561.28	39.45	42.0	120.0
BOT LEFT FRONT SEAT X (LB)	38.74	58.41	25.59	384.0	33.0
BOT LEFT FRONT SEAT Y (LB)	31.53	82.64	31.99	27.0	2.0
BOT LEFT FRONT SEAT Z (LB)	35.59	36.79	-101.01	2.0	31.0
BOT LEFT FRONT SEAT RES (LB)	61.40	130.04	62.04	31.0	0.0
BOT RIGHT FRONT SEAT X (LB)	-39.20	-19.88	-55.00	28.0	33.0
BOT RIGHT FRONT SEAT Y (LB)	38.18	40.41	-13.69	3.0	123.0
BOT RIGHT FRONT SEAT Z (LB)	58.26	59.53	-57.05	1.0	31.0
BOT RIGHT FRONT SEAT RES (LB)	79.98	80.96	29.24	0.0	478.0
BOT LEFT REAR SEAT X (LB)	33.49	70.34	-179.12	283.0	33.0
BOT LEFT REAR SEAT Y (LB)	-44.91	-38.90	-131.20	6.0	42.0
BOT LEFT REAR SEAT Z (LB)	38.25	51.49	29.16	301.0	101.0
BOT LEFT REAR SEAT RES (LB)	67.89	211.07	61.95	41.0	17.0
BOT RIGHT REAR SEAT X (LB)	-51.55	30.48	-362.68	135.0	56.0



BOT RIGHT REAR SEAT Y (LB)	35.83	36.79	-51.25	3.0	47.0
BOT RIGHT REAR SEAT Z (LB)	55.17	54.27	-463.16	2.0	50.0
BOT RIGHT REAR SEAT RES (LB)	83.65	584.22	54.28	50.0	14.0
LEFT SHOULDER FORCE (LB)	18.23	173.02	8.86	23.0	451.0
RIGHT SHOULDER FORCE (LB)	28.86	64.71	8.98	28.0	59.0
LEFT LAP FORCE (LB)	24.19	80.90	2.52	28.0	454.0
RIGHT LAP FORCE (LB)	31.64	176.43	16.35	26.0	450.0
INT HEAD X ACCEL (G)	0.07	1.53	-15.34	478.0	88.0
INT HEAD Y ACCEL (G)	0.16	10.65	-5.20	86.0	29.0
INT HEAD Z ACCEL (G)	-0.13	28.91	-8.16	78.0	24.0
INT HEAD RESULTANT (G)	0.23	29.07	0.17	78.0	11.0
INT HEAD HIC		58.48		76.0	91.0
INT HEAD Ry ANG ACC (RAD/S2)	8.98	1792.72	-2370.31	59.0	78.0
INT NECK X FORCE (LB)	11.53	115.11	-87.19	78.0	31.0
INT NECK Y FORCE (LB)	-16.87	22.29	-39.38	62.0	89.0
INT NECK Z FORCE (LB)	-18.27	371.43	-118.26	61.0	45.0
INT NECK FORCE RES (LB)	27.41	380.65	13.51	61.0	240.0
INT NECK Mx TORQUE (IN-LB)	16.98	193.78	-165.69	51.0	98.0
INT NECK My TORQUE (IN-LB)	-30.10	999.02	-263.07	78.0	31.0
INT NECK Mz TORQUE (IN-LB)	-18.17	78.98	-51.33	184.0	66.0
INT NECK TORQUE RES (IN-LB)	39.06	999.28	18.91	78.0	19.0
INT CHEST X ACCEL (G)	0.07	9.38	-5.00	64.0	58.0
INT CHEST Y ACCEL (G)	-0.15	8.77	-3.02	55.0	76.0
INT CHEST Z ACCEL (G)	-0.04	36.46	-0.78	67.0	26.0
INT CHEST RESULTANT (G)	0.18	37.12	0.09	67.0	1.0
INT CHEST Ry ANG ACC (RAD/S2)	-3.39	1206.89	-2054.45	73.0	59.0
INT LUMBAR X ACCEL (G)	0.19	26.22	-8.51	46.0	25.0
INT LUMBAR Y ACCEL (G)	-0.16	4.25	-15.38	76.0	55.0
INT LUMBAR Z ACCEL (G)	-0.09	35.61	-18.16	54.0	48.0
INT LUMBAR RESULTANT (G)	0.29	39.72	0.16	54.0	9.0
INT LUMBAR X FORCE (LB)	22.25	368.17	-54.14	51.0	81.0
INT LUMBAR Y FORCE (LB)	-2.04	31.42	-101.13	35.0	86.0
INT LUMBAR Z FORCE (LB)	41.78	218.86	-1231.47	82.0	45.0
INT LUMBAR FORCE RES (LB)	47.40	1267.81	31.85	45.0	16.0
INT LUMBAR Mx TORQUE (IN-LB)	-45.82	176.38	-1178.17	35.0	70.0
INT LUMBAR My TORQUE (IN-LB)	80.42	1078.15	-946.44	74.0	48.0
INT LUMBAR Mz TORQUE (IN-LB)	-50.41	-11.01	-301.82	21.0	81.0
INT LUMBAR TORQUE RES (IN-LB)	105.43	1567.32	31.85	71.0	22.0
NIJ SHEAR (LB)		115.11	-87.19	78.0	31.0
NIJ TENSION (LB)		371.43		61.0	

NIJ COMPRESSION (LB)		-118.26		45.0	
NIJ FLEXION (IN-LB)		918.44		78.0	
NIJ EXTENSION (IN-LB)		202.04		31.0	
NIJ NTF	0.0000	0.3610	0.0000	72.0	0.0
NIJ NTE	0.0000	0.2765	0.0000	30.0	0.0
NIJ NCF	0.0000	0.3391	0.0000	77.0	0.0
NIJ NCE	0.0451	0.0497	0.0000	42.0	20.0
NIJ NTF AIS >= 2		0.16			
NIJ NTF AIS >= 3		0.07			
NIJ NTF AIS >= 4		0.09			
NIJ NTF AIS >= 5		0.03			
NIJ NTE AIS >= 2		0.15			
NIJ NTE AIS >= 3		0.06			
NIJ NTE AIS >= 4		0.09			
NIJ NTE AIS >= 5		0.03			
NIJ NCF AIS >= 2		0.16			
NIJ NCF AIS >= 3		0.07			
NIJ NCF AIS >= 4		0.09			
NIJ NCF AIS >= 5		0.03			
NIJ NCE AIS >= 2		0.12			
NIJ NCE AIS >= 3		0.04			
NIJ NCE AIS >= 4		0.07			
NIJ NCE AIS >= 5		0.02			
MNIx	0.0142	0.1622	0.0000	51.0	161.0
NMIz	0.0152	0.0661	0.0000	184.0	258.0

201204 Test: 6280 Test Date: 121025 Subj: HB50 Wt: 165.0  
 Nom G: 35.0 Cell: J

Data ID	Immediate Preimpact	Maximum Value	Minimum Value	Time Of Maximum	Time Of Minimum
Reference Mark Time (Ms)				-109.0	
Impact Rise Time (Ms)				28.2	
Impact Duration (Ms)				90.9	
Velocity Change (Ft/Sec)		48.65			
CARRIAGE X ACCEL (G)	0.04	8.80	-6.96	31.0	35.0
CARRIAGE Y ACCEL (G)	-0.02	1.82	-1.10	13.0	56.0
CARRIAGE Z ACCEL (G)	0.01	30.18	0.37	32.0	0.0
INTEGRATED ACCEL (FT/SEC)	48.10	48.65	3.27	2.0	437.0
SEAT FIXTURE X ACCEL (G)	-0.06	5.32	-7.55	22.0	17.0
SEAT FIXTURE Y ACCEL (G)	0.05	6.68	-5.81	35.0	10.0
SEAT FIXTURE Z ACCEL (G)	0.05	36.61	0.36	27.0	0.0
SEAT FIXTURE DRZ	0.00	37.78	-12.88	60.0	123.0
SEAT PAN X ACCEL (G)	-0.04	76.11	-42.30	83.0	96.0
SEAT PAN Y ACCEL (G)	-0.03	83.94	-44.30	83.0	88.0
SEAT PAN Z ACCEL (G)	-0.08	61.33	-61.90	44.0	58.0
SEAT PAN DRZ	-0.04	21.25	-17.90	127.0	76.0
TOP LEFT FRONT SEAT X (LB)	-30.05	114.58	-43.97	78.0	258.0
TOP LEFT FRONT SEAT Y (LB)	-35.91	-16.37	-68.10	66.0	102.0
TOP LEFT FRONT SEAT Z (LB)	-32.55	186.63	-615.69	259.0	41.0
TOP LEFT FRONT SEAT RES (LB)	57.13	620.70	56.43	41.0	2.0
TOP RIGHT FRONT SEAT X (LB)	-56.87	42.88	-84.41	40.0	253.0
TOP RIGHT FRONT SEAT Y (LB)	-39.47	269.53	-461.68	187.0	38.0
TOP RIGHT FRONT SEAT Z (LB)	-38.97	-10.47	-77.57	367.0	39.0
TOP RIGHT FRONT SEAT RES (LB)	79.53	469.07	58.86	38.0	114.0
BOT LEFT FRONT SEAT X (LB)	43.14	62.93	23.60	36.0	62.0
BOT LEFT FRONT SEAT Y (LB)	44.29	87.25	24.64	87.0	224.0
BOT LEFT FRONT SEAT Z (LB)	37.04	37.38	-91.57	0.0	28.0
BOT LEFT FRONT SEAT RES (LB)	72.15	134.35	51.16	27.0	219.0
BOT RIGHT FRONT SEAT X (LB)	-44.86	-28.50	-62.29	37.0	32.0
BOT RIGHT FRONT SEAT Y (LB)	33.60	35.85	-13.04	0.0	433.0
BOT RIGHT FRONT SEAT Z (LB)	53.47	58.89	-47.73	0.0	27.0
BOT RIGHT FRONT SEAT RES (LB)	77.49	83.10	34.48	0.0	38.0
BOT LEFT REAR SEAT X (LB)	41.73	59.92	-238.37	249.0	60.0
BOT LEFT REAR SEAT Y (LB)	-50.42	-46.80	-179.95	5.0	141.0
BOT LEFT REAR SEAT Z (LB)	43.94	58.91	35.35	257.0	400.0
BOT LEFT REAR SEAT RES (LB)	78.88	292.74	71.80	60.0	18.0
BOT RIGHT REAR SEAT X (LB)	-47.88	-14.02	-252.88	65.0	31.0

BOT RIGHT REAR SEAT Y (LB)	40.86	42.03	-34.80	5.0	38.0
BOT RIGHT REAR SEAT Z (LB)	54.50	52.42	-355.20	1.0	36.0
BOT RIGHT REAR SEAT RES (LB)	83.32	420.80	47.12	30.0	13.0
LEFT SHOULDER FORCE (LB)	10.71	200.42	-2.82	54.0	156.0
RIGHT SHOULDER FORCE (LB)	15.65	202.81	8.38	113.0	459.0
LEFT LAP FORCE (LB)	17.18	38.33	-0.24	67.0	22.0
RIGHT LAP FORCE (LB)	26.33	47.86	6.31	55.0	370.0
INT HEAD X ACCEL (G)	0.08	11.47	-22.00	241.0	101.0
INT HEAD Y ACCEL (G)	0.13	2.34	-6.22	285.0	69.0
INT HEAD Z ACCEL (G)	-0.03	26.28	-11.54	66.0	54.0
INT HEAD RESULTANT (G)	0.16	28.76	0.14	66.0	3.0
INT HEAD HIC		36.22		92.0	107.0
INT HEAD Ry ANG ACC (RAD/S2)	6.86	1340.54	-1221.23	63.0	119.0
INT NECK X FORCE (LB)	11.47	50.31	-192.15	42.0	97.0
INT NECK Y FORCE (LB)	-12.48	58.22	-40.37	109.0	267.0
INT NECK Z FORCE (LB)	-12.31	121.01	-359.88	54.0	66.0
INT NECK FORCE RES (LB)	20.96	373.66	15.85	66.0	26.0
INT NECK Mx TORQUE (IN-LB)	18.28	257.43	-142.12	85.0	68.0
INT NECK My TORQUE (IN-LB)	-28.90	765.21	-109.06	117.0	54.0
INT NECK Mz TORQUE (IN-LB)	-15.54	60.12	-63.60	77.0	255.0
INT NECK TORQUE RES (IN-LB)	37.57	765.37	4.72	117.0	341.0
INT CHEST X ACCEL (G)	0.03	11.87	-14.29	53.0	59.0
INT CHEST Y ACCEL (G)	-0.08	8.88	-3.18	76.0	89.0
INT CHEST Z ACCEL (G)	-0.10	21.82	-3.93	41.0	54.0
INT CHEST RESULTANT (G)	0.14	22.54	0.06	77.0	4.0
INT CHEST Ry ANG ACC (RAD/S2)	-0.83	1346.61	-1979.09	56.0	62.0
INT LUMBAR X ACCEL (G)	0.10	24.10	-2.48	30.0	111.0
INT LUMBAR Y ACCEL (G)	-0.06	12.17	-4.27	44.0	77.0
INT LUMBAR Z ACCEL (G)	-0.11	35.47	-9.25	64.0	48.0
INT LUMBAR RESULTANT (G)	0.17	35.91	0.05	64.0	2.0
INT LUMBAR X FORCE (LB)	7.23	490.97	-227.24	48.0	86.0
INT LUMBAR Y FORCE (LB)	-7.29	134.33	-110.65	66.0	77.0
INT LUMBAR Z FORCE (LB)	59.26	392.35	-1185.44	84.0	43.0
INT LUMBAR FORCE RES (LB)	60.15	1254.43	18.52	43.0	427.0
INT LUMBAR Mx TORQUE (IN-LB)	46.60	1157.81	-119.14	66.0	77.0
INT LUMBAR My TORQUE (IN-LB)	36.33	1717.77	-1917.42	86.0	47.0
INT LUMBAR Mz TORQUE (IN-LB)	-26.21	115.73	-30.83	65.0	39.0
INT LUMBAR TORQUE RES (IN-LB)	64.74	1971.56	50.65	47.0	30.0
NIJ SHEAR (LB)		50.31	-192.15	42.0	97.0
NIJ TENSION (LB)		121.01		54.0	

NIJ COMPRESSION (LB)		-359.88		66.0	
NIJ FLEXION (IN-LB)		820.58		116.0	
NIJ EXTENSION (IN-LB)		103.55		257.0	
NIJ NTF	0.0000	0.3111	0.0000	117.0	0.0
NIJ NTE	0.0000	0.1581	0.0000	54.0	0.0
NIJ NCF	0.0000	0.3197	0.0000	104.0	0.0
NIJ NCE	0.0398	0.2242	0.0000	44.0	26.0
NIJ NTF AIS >= 2		0.16			
NIJ NTF AIS >= 3		0.07			
NIJ NTF AIS >= 4		0.09			
NIJ NTF AIS >= 5		0.03			
NIJ NTE AIS >= 2		0.13			
NIJ NTE AIS >= 3		0.05			
NIJ NTE AIS >= 4		0.08			
NIJ NTE AIS >= 5		0.03			
NIJ NCF AIS >= 2		0.16			
NIJ NCF AIS >= 3		0.07			
NIJ NCF AIS >= 4		0.09			
NIJ NCF AIS >= 5		0.03			
NIJ NCE AIS >= 2		0.14			
NIJ NCE AIS >= 3		0.06			
NIJ NCE AIS >= 4		0.08			
NIJ NCE AIS >= 5		0.03			
MNIx	0.0153	0.2154	0.0000	85.0	339.0
NMIz	0.0130	0.0532	0.0001	255.0	130.0

201204 Test: 6281 Test Date: 121026 Subj: HB50 Wt: 165.0  
 Nom G: 35.0 Cell: L

Data ID	Immediate Preimpact	Maximum Value	Minimum Value	Time Of Maximum	Time Of Minimum
Reference Mark Time (Ms)				-110.0	
Impact Rise Time (Ms)				27.6	
Impact Duration (Ms)				91.3	
Velocity Change (Ft/Sec)		48.60			
CARRIAGE X ACCEL (G)	0.15	7.35	-5.25	32.0	36.0
CARRIAGE Y ACCEL (G)	-0.01	1.44	-0.80	29.0	67.0
CARRIAGE Z ACCEL (G)	0.00	31.59	0.38	28.0	0.0
INTEGRATED ACCEL (FT/SEC)	48.04	48.60	2.75	2.0	430.0
SEAT FIXTURE X ACCEL (G)	0.03	5.15	-5.34	30.0	16.0
SEAT FIXTURE Y ACCEL (G)	0.07	13.01	-4.65	36.0	30.0
SEAT FIXTURE Z ACCEL (G)	0.03	35.69	0.34	24.0	0.0
SEAT FIXTURE DRZ	0.01	37.76	-12.85	60.0	123.0
SEAT PAN X ACCEL (G)	-0.06	32.74	-0.67	33.0	189.0
SEAT PAN Y ACCEL (G)	0.02	1.65	-9.04	15.0	31.0
SEAT PAN Z ACCEL (G)	0.05	18.02	-2.69	31.0	98.0
SEAT PAN DRZ	0.07	15.18	-5.91	64.0	129.0
TOP LEFT FRONT SEAT X (LB)	-32.13	139.89	-55.96	34.0	173.0
TOP LEFT FRONT SEAT Y (LB)	-35.23	16.37	-70.05	34.0	360.0
TOP LEFT FRONT SEAT Z (LB)	-16.14	324.88	-548.09	170.0	38.0
TOP LEFT FRONT SEAT RES (LB)	50.42	558.92	47.94	37.0	3.0
TOP RIGHT FRONT SEAT X (LB)	-53.24	109.83	-68.31	32.0	173.0
TOP RIGHT FRONT SEAT Y (LB)	-46.60	73.43	-687.78	171.0	39.0
TOP RIGHT FRONT SEAT Z (LB)	-38.40	-22.16	-91.10	153.0	39.0
TOP RIGHT FRONT SEAT RES (LB)	80.55	694.31	58.04	39.0	127.0
BOT LEFT FRONT SEAT X (LB)	40.48	56.36	18.35	12.0	216.0
BOT LEFT FRONT SEAT Y (LB)	40.36	95.88	39.95	23.0	3.0
BOT LEFT FRONT SEAT Z (LB)	40.15	39.24	-97.78	1.0	28.0
BOT LEFT FRONT SEAT RES (LB)	69.91	133.54	66.49	27.0	7.0
BOT RIGHT FRONT SEAT X (LB)	-42.28	-27.17	-57.65	440.0	30.0
BOT RIGHT FRONT SEAT Y (LB)	37.20	40.41	-24.11	1.0	156.0
BOT RIGHT FRONT SEAT Z (LB)	53.99	55.78	-67.56	4.0	30.0
BOT RIGHT FRONT SEAT RES (LB)	78.08	91.23	31.76	30.0	440.0
BOT LEFT REAR SEAT X (LB)	40.40	94.42	-203.81	182.0	30.0
BOT LEFT REAR SEAT Y (LB)	-53.91	-52.06	-179.25	2.0	37.0
BOT LEFT REAR SEAT Z (LB)	40.57	60.15	32.86	299.0	60.0
BOT LEFT REAR SEAT RES (LB)	78.78	266.21	79.62	40.0	5.0
BOT RIGHT REAR SEAT X (LB)	-46.18	15.84	-298.52	325.0	40.0

BOT RIGHT REAR SEAT Y (LB)	34.29	32.17	-81.41	3.0	38.0
BOT RIGHT REAR SEAT Z (LB)	51.52	49.93	-275.54	2.0	37.0
BOT RIGHT REAR SEAT RES (LB)	77.31	408.80	18.71	39.0	279.0
LEFT SHOULDER FORCE (LB)	13.28	177.50	0.84	22.0	486.0
RIGHT SHOULDER FORCE (LB)	14.02	153.52	5.79	21.0	390.0
LEFT LAP FORCE (LB)	17.84	26.44	-2.16	296.0	34.0
RIGHT LAP FORCE (LB)	23.94	29.82	-0.60	28.0	34.0
INT HEAD X ACCEL (G)	0.07	0.61	-7.62	51.0	100.0
INT HEAD Y ACCEL (G)	0.20	2.11	-3.82	69.0	28.0
INT HEAD Z ACCEL (G)	0.04	27.01	-3.39	40.0	27.0
INT HEAD RESULTANT (G)	0.21	27.04	0.14	40.0	331.0
INT HEAD HIC		27.31		84.0	99.0
INT HEAD Ry ANG ACC (RAD/S2)	-1.19	1243.36	-466.92	59.0	78.0
INT NECK X FORCE (LB)	8.29	74.00	-70.27	45.0	28.0
INT NECK Y FORCE (LB)	-9.90	20.80	-16.22	30.0	490.0
INT NECK Z FORCE (LB)	-10.21	141.44	-203.66	27.0	41.0
INT NECK FORCE RES (LB)	16.47	215.05	11.55	41.0	304.0
INT NECK Mx TORQUE (IN-LB)	14.40	128.62	-31.24	39.0	56.0
INT NECK My TORQUE (IN-LB)	-22.90	347.79	-216.09	82.0	28.0
INT NECK Mz TORQUE (IN-LB)	-13.63	3.38	-68.49	20.0	46.0
INT NECK TORQUE RES (IN-LB)	30.32	348.56	16.45	82.0	19.0
INT CHEST X ACCEL (G)	0.14	8.05	-5.49	54.0	23.0
INT CHEST Y ACCEL (G)	-0.02	1.81	-2.48	63.0	24.0
INT CHEST Z ACCEL (G)	0.02	28.67	-1.40	39.0	45.0
INT CHEST RESULTANT (G)	0.16	28.95	0.12	39.0	4.0
INT CHEST Ry ANG ACC (RAD/S2)	-1.55	686.25	-888.13	30.0	49.0
INT LUMBAR X ACCEL (G)	0.19	25.11	-4.55	37.0	23.0
INT LUMBAR Y ACCEL (G)	0.06	7.31	-7.45	23.0	27.0
INT LUMBAR Z ACCEL (G)	-0.03	27.20	-1.06	36.0	169.0
INT LUMBAR RESULTANT (G)	0.22	36.68	0.04	36.0	309.0
INT LUMBAR X FORCE (LB)	-0.76	856.15	-31.82	99.0	310.0
INT LUMBAR Y FORCE (LB)	-3.92	20.41	-35.51	22.0	62.0
INT LUMBAR Z FORCE (LB)	51.90	138.00	-1430.58	174.0	43.0
INT LUMBAR FORCE RES (LB)	52.08	1505.21	16.97	43.0	18.0
INT LUMBAR Mx TORQUE (IN-LB)	62.40	187.78	-85.90	24.0	63.0
INT LUMBAR My TORQUE (IN-LB)	113.58	569.69	-2662.81	188.0	99.0
INT LUMBAR Mz TORQUE (IN-LB)	16.41	54.89	-24.80	52.0	277.0
INT LUMBAR TORQUE RES (IN-LB)	130.82	2663.13	48.75	99.0	29.0
NIJ SHEAR (LB)		74.00	-70.27	45.0	28.0
NIJ TENSION (LB)		141.44		27.0	

NIJ COMPRESSION (LB)		-203.66		41.0	
NIJ FLEXION (IN-LB)		339.32		82.0	
NIJ EXTENSION (IN-LB)		166.90		28.0	
NIJ NTF	0.0000	0.0703	0.0000	159.0	0.0
NIJ NTE	0.0000	0.2316	0.0000	28.0	0.0
NIJ NCF	0.0000	0.2602	0.0000	82.0	0.0
NIJ NCE	0.0314	0.1962	0.0000	60.0	20.0
NIJ NTF AIS >= 2		0.12			
NIJ NTF AIS >= 3		0.04			
NIJ NTF AIS >= 4		0.07			
NIJ NTF AIS >= 5		0.02			
NIJ NTE AIS >= 2		0.14			
NIJ NTE AIS >= 3		0.06			
NIJ NTE AIS >= 4		0.08			
NIJ NTE AIS >= 5		0.03			
NIJ NCF AIS >= 2		0.15			
NIJ NCF AIS >= 3		0.06			
NIJ NCF AIS >= 4		0.08			
NIJ NCF AIS >= 5		0.03			
NIJ NCE AIS >= 2		0.14			
NIJ NCE AIS >= 3		0.06			
NIJ NCE AIS >= 4		0.08			
NIJ NCE AIS >= 5		0.03			
MNIx	0.0121	0.1076	0.0001	39.0	52.0
NMIz	0.0114	0.0573	0.0000	46.0	18.0



201204 Test: 6282 Test Date: 121029 Subj: HB50 Wt: 165.0  
 Nom G: 35.0 Cell: M

Data ID	Immediate Preimpact	Maximum Value	Minimum Value	Time Of Maximum	Time Of Minimum
Reference Mark Time (Ms)				-109.0	
Impact Rise Time (Ms)				24.8	
Impact Duration (Ms)				89.7	
Velocity Change (Ft/Sec)		48.61			
CARRIAGE X ACCEL (G)	0.05	8.32	-7.17	32.0	36.0
CARRIAGE Y ACCEL (G)	-0.03	1.23	-1.44	13.0	58.0
CARRIAGE Z ACCEL (G)	0.00	30.17	0.27	27.0	0.0
INTEGRATED ACCEL (FT/SEC)	48.04	48.61	3.72	2.0	428.0
SEAT FIXTURE X ACCEL (G)	-0.09	4.42	-5.67	22.0	17.0
SEAT FIXTURE Y ACCEL (G)	0.05	6.01	-4.10	35.0	10.0
SEAT FIXTURE Z ACCEL (G)	0.02	36.98	0.25	27.0	0.0
SEAT FIXTURE DRZ	-0.01	37.79	-12.94	60.0	124.0
SEAT PAN X ACCEL (G)	-0.04	55.75	-21.72	45.0	64.0
SEAT PAN Y ACCEL (G)	0.13	15.20	-29.29	52.0	56.0
SEAT PAN Z ACCEL (G)	-0.07	21.19	-44.42	44.0	39.0
SEAT PAN DRZ	-0.08	0.88	-11.88	282.0	56.0
TOP LEFT FRONT SEAT X (LB)	-25.83	95.29	-31.98	44.0	11.0
TOP LEFT FRONT SEAT Y (LB)	-31.31	-3.93	-49.77	57.0	98.0
TOP LEFT FRONT SEAT Z (LB)	-35.46	151.30	-727.95	216.0	42.0
TOP LEFT FRONT SEAT RES (LB)	53.98	733.65	42.53	42.0	119.0
TOP RIGHT FRONT SEAT X (LB)	-53.29	55.60	-62.97	43.0	184.0
TOP RIGHT FRONT SEAT Y (LB)	-30.48	408.07	-370.02	311.0	34.0
TOP RIGHT FRONT SEAT Z (LB)	-37.87	-6.77	-72.05	177.0	46.0
TOP RIGHT FRONT SEAT RES (LB)	72.19	411.41	41.91	311.0	107.0
BOT LEFT FRONT SEAT X (LB)	41.46	54.43	13.12	26.0	402.0
BOT LEFT FRONT SEAT Y (LB)	40.82	66.62	39.97	42.0	0.0
BOT LEFT FRONT SEAT Z (LB)	29.46	29.91	-72.28	1.0	28.0
BOT LEFT FRONT SEAT RES (LB)	65.34	102.61	61.26	27.0	402.0
BOT RIGHT FRONT SEAT X (LB)	-38.26	-23.19	-53.02	467.0	32.0
BOT RIGHT FRONT SEAT Y (LB)	30.53	34.54	-7.17	1.0	32.0
BOT RIGHT FRONT SEAT Z (LB)	47.62	50.22	-39.68	0.0	29.0
BOT RIGHT FRONT SEAT RES (LB)	68.34	69.88	29.23	1.0	38.0
BOT LEFT REAR SEAT X (LB)	36.04	77.50	-205.79	317.0	39.0
BOT LEFT REAR SEAT Y (LB)	-43.58	-38.23	-179.97	0.0	41.0
BOT LEFT REAR SEAT Z (LB)	39.44	56.45	31.02	306.0	81.0
BOT LEFT REAR SEAT RES (LB)	69.01	268.65	64.21	40.0	16.0
BOT RIGHT REAR SEAT X (LB)	-45.02	27.42	-339.42	325.0	40.0

BOT RIGHT REAR SEAT Y (LB)	32.71	31.52	-111.65	2.0	39.0
BOT RIGHT REAR SEAT Z (LB)	42.76	40.70	-662.86	0.0	42.0
BOT RIGHT REAR SEAT RES (LB)	70.28	748.63	46.37	41.0	11.0
LEFT SHOULDER FORCE (LB)	6.72	103.81	0.48	41.0	479.0
RIGHT SHOULDER FORCE (LB)	12.58	102.46	4.52	60.0	483.0
LEFT LAP FORCE (LB)	19.38	34.39	-1.26	321.0	53.0
RIGHT LAP FORCE (LB)	-25.24	-1.84	-39.40	61.0	320.0
INT HEAD X ACCEL (G)	0.10	3.25	-14.10	52.0	107.0
INT HEAD Y ACCEL (G)	0.17	0.58	-3.00	343.0	95.0
INT HEAD Z ACCEL (G)	0.00	20.43	-2.67	41.0	200.0
INT HEAD RESULTANT (G)	0.21	21.04	0.14	65.0	6.0
INT HEAD HIC		25.20		54.0	69.0
INT HEAD Ry ANG ACC (RAD/S2)	-0.96	1489.56	-783.60	62.0	125.0
INT NECK X FORCE (LB)	11.79	52.26	-145.98	42.0	109.0
INT NECK Y FORCE (LB)	-12.93	28.26	-19.64	95.0	342.0
INT NECK Z FORCE (LB)	-10.80	25.13	-290.50	191.0	42.0
INT NECK FORCE RES (LB)	20.57	295.45	14.69	42.0	239.0
INT NECK Mx TORQUE (IN-LB)	13.02	143.33	-34.13	108.0	57.0
INT NECK My TORQUE (IN-LB)	-24.83	476.06	-207.86	128.0	62.0
INT NECK Mz TORQUE (IN-LB)	-16.01	9.57	-23.77	123.0	104.0
INT NECK TORQUE RES (IN-LB)	32.35	484.33	3.47	128.0	50.0
INT CHEST X ACCEL (G)	0.13	13.96	-5.45	57.0	94.0
INT CHEST Y ACCEL (G)	0.03	2.58	-2.53	50.0	63.0
INT CHEST Z ACCEL (G)	-0.03	27.29	-0.28	63.0	212.0
INT CHEST RESULTANT (G)	0.15	27.54	0.09	63.0	167.0
INT CHEST Ry ANG ACC (RAD/S2)	-1.24	1110.28	-1020.61	29.0	57.0
INT LUMBAR X ACCEL (G)	0.17	35.38	-2.12	41.0	24.0
INT LUMBAR Y ACCEL (G)	0.21	6.26	-7.51	24.0	28.0
INT LUMBAR Z ACCEL (G)	-0.05	41.31	-2.10	47.0	42.0
INT LUMBAR RESULTANT (G)	0.29	42.38	0.17	47.0	3.0
INT LUMBAR X FORCE (LB)	-0.24	833.83	-37.83	57.0	339.0
INT LUMBAR Y FORCE (LB)	-9.67	27.66	-94.09	59.0	88.0
INT LUMBAR Z FORCE (LB)	60.20	140.25	-1131.52	144.0	41.0
INT LUMBAR FORCE RES (LB)	60.98	1217.96	12.23	51.0	19.0
INT LUMBAR Mx TORQUE (IN-LB)	-29.61	278.36	-186.71	59.0	30.0
INT LUMBAR My TORQUE (IN-LB)	-2.73	630.07	-2931.64	214.0	57.0
INT LUMBAR Mz TORQUE (IN-LB)	-45.36	95.71	-52.73	99.0	51.0
INT LUMBAR TORQUE RES (IN-LB)	54.32	2942.01	40.37	57.0	126.0
NIJ SHEAR (LB)		52.26	-145.98	42.0	109.0
NIJ TENSION (LB)		25.13		191.0	

NIJ COMPRESSION (LB)		-290.50		42.0	
NIJ FLEXION (IN-LB)		551.09		126.0	
NIJ EXTENSION (IN-LB)		186.67		62.0	
NIJ NTF	0.0000	0.2004	0.0000	129.0	0.0
NIJ NTE	0.0000	0.0829	0.0000	218.0	0.0
NIJ NCF	0.0000	0.3674	0.0000	88.0	0.0
NIJ NCE	0.0355	0.3379	0.0000	63.0	36.0
NIJ NTF AIS >= 2		0.14			
NIJ NTF AIS >= 3		0.06			
NIJ NTF AIS >= 4		0.08			
NIJ NTF AIS >= 5		0.03			
NIJ NTE AIS >= 2		0.12			
NIJ NTE AIS >= 3		0.04			
NIJ NTE AIS >= 4		0.07			
NIJ NTE AIS >= 5		0.02			
NIJ NCF AIS >= 2		0.17			
NIJ NCF AIS >= 3		0.08			
NIJ NCF AIS >= 4		0.10			
NIJ NCF AIS >= 5		0.03			
NIJ NCE AIS >= 2		0.16			
NIJ NCE AIS >= 3		0.07			
NIJ NCE AIS >= 4		0.09			
NIJ NCE AIS >= 5		0.03			
MNIx	0.0109	0.1199	0.0001	108.0	211.0
NMIz	0.0134	0.0199	0.0000	104.0	45.0

201204 Test: 6283 Test Date: 121030 Subj: LARD Wt: 243.0  
 Nom G: 35.0 Cell: N

Data ID	Immediate Preimpact	Maximum Value	Minimum Value	Time Of Maximum	Time Of Minimum
Reference Mark Time (Ms)				-121.0	
Impact Rise Time (Ms)				23.5	
Impact Duration (Ms)				87.4	
Velocity Change (Ft/Sec)		48.95			
CARRIAGE X ACCEL (G)	-0.05	8.89	-7.62	31.0	35.0
CARRIAGE Y ACCEL (G)	-0.04	1.36	-1.77	20.0	55.0
CARRIAGE Z ACCEL (G)	0.00	33.31	0.47	24.0	0.0
INTEGRATED ACCEL (FT/SEC)	48.40	48.95	2.54	1.0	433.0
SEAT FIXTURE X ACCEL (G)	0.07	8.08	-6.50	60.0	65.0
SEAT FIXTURE Y ACCEL (G)	-0.11	14.34	-10.34	36.0	47.0
SEAT FIXTURE Z ACCEL (G)	0.00	36.44	0.40	24.0	94.0
SEAT FIXTURE DRZ	-0.06	38.04	-13.54	59.0	122.0
SEAT PAN X ACCEL (G)	-0.05	68.76	-13.91	89.0	40.0
SEAT PAN Y ACCEL (G)	-0.11	132.91	-82.30	68.0	63.0
SEAT PAN Z ACCEL (G)	-0.07	51.87	-108.47	49.0	58.0
SEAT PAN DRZ	-0.05	10.79	-15.77	145.0	90.0
TOP LEFT FRONT SEAT X (LB)	-32.64	62.61	-50.62	36.0	472.0
TOP LEFT FRONT SEAT Y (LB)	-34.30	-17.02	-69.40	27.0	104.0
TOP LEFT FRONT SEAT Z (LB)	5.03	387.50	-433.38	228.0	34.0
TOP LEFT FRONT SEAT RES (LB)	47.72	437.59	42.57	35.0	2.0
TOP RIGHT FRONT SEAT X (LB)	-49.92	49.56	-69.65	38.0	376.0
TOP RIGHT FRONT SEAT Y (LB)	-43.73	90.49	-651.78	225.0	36.0
TOP RIGHT FRONT SEAT Z (LB)	-37.60	-24.62	-81.26	478.0	60.0
TOP RIGHT FRONT SEAT RES (LB)	76.34	656.27	51.30	37.0	146.0
BOT LEFT FRONT SEAT X (LB)	40.38	236.60	-109.45	91.0	136.0
BOT LEFT FRONT SEAT Y (LB)	47.54	311.65	31.96	93.0	83.0
BOT LEFT FRONT SEAT Z (LB)	28.27	40.49	-313.30	135.0	95.0
BOT LEFT FRONT SEAT RES (LB)	68.53	468.63	56.74	93.0	310.0
BOT RIGHT FRONT SEAT X (LB)	-39.02	3.98	-56.99	79.0	32.0
BOT RIGHT FRONT SEAT Y (LB)	33.51	45.62	9.78	96.0	80.0
BOT RIGHT FRONT SEAT Z (LB)	49.02	47.73	-91.12	0.0	80.0
BOT RIGHT FRONT SEAT RES (LB)	71.10	91.73	26.80	80.0	26.0
BOT LEFT REAR SEAT X (LB)	40.55	79.45	-272.85	40.0	32.0
BOT LEFT REAR SEAT Y (LB)	-50.16	-47.45	-142.36	3.0	32.0
BOT LEFT REAR SEAT Z (LB)	40.45	45.88	24.80	302.0	282.0
BOT LEFT REAR SEAT RES (LB)	76.18	309.77	69.95	32.0	14.0
BOT RIGHT REAR SEAT X (LB)	-43.77	16.45	-421.01	41.0	33.0

BOT RIGHT REAR SEAT Y (LB)	34.47	31.52	-59.75	1.0	35.0
BOT RIGHT REAR SEAT Z (LB)	50.83	53.01	-448.78	1.0	33.0
BOT RIGHT REAR SEAT RES (LB)	75.47	618.05	48.16	33.0	9.0
LEFT SHOULDER FORCE (LB)	15.87	76.28	0.78	57.0	249.0
RIGHT SHOULDER FORCE (LB)	17.74	33.83	2.05	58.0	466.0
LEFT LAP FORCE (LB)	16.14	24.77	-17.81	196.0	96.0
RIGHT LAP FORCE (LB)	-18.70	-1.07	-80.21	20.0	99.0
INT HEAD X ACCEL (G)	-0.04	6.09	-25.48	202.0	118.0
INT HEAD Y ACCEL (G)	0.11	2.81	-2.41	135.0	71.0
INT HEAD Z ACCEL (G)	0.02	32.80	-5.42	100.0	181.0
INT HEAD RESULTANT (G)	0.13	36.41	0.08	101.0	1.0
INT HEAD HIC		71.26		96.0	111.0
INT HEAD Ry ANG ACC (RAD/S2)	-10.74	1193.21	-1612.24	103.0	123.0
INT NECK X FORCE (LB)	11.76	72.82	-400.33	225.0	122.0
INT NECK Y FORCE (LB)	-11.16	17.20	-26.64	101.0	135.0
INT NECK Z FORCE (LB)	-0.95	88.78	-437.11	180.0	100.0
INT NECK FORCE RES (LB)	16.26	470.31	10.04	100.0	296.0
INT NECK Mx TORQUE (IN-LB)	9.63	138.57	-15.52	119.0	167.0
INT NECK My TORQUE (IN-LB)	-27.24	410.13	-160.05	124.0	63.0
INT NECK Mz TORQUE (IN-LB)	-13.15	29.83	-71.46	379.0	163.0
INT NECK TORQUE RES (IN-LB)	31.76	426.63	7.37	124.0	341.0
INT CHEST X ACCEL (G)	0.09	6.91	-12.39	119.0	96.0
INT CHEST Y ACCEL (G)	-0.14	2.68	-0.79	114.0	57.0
INT CHEST Z ACCEL (G)	-0.04	34.66	-1.02	104.0	214.0
INT CHEST RESULTANT (G)	0.18	35.32	0.13	96.0	5.0
INT CHEST Ry ANG ACC (RAD/S2)	-0.44	902.53	-968.96	94.0	103.0
INT LUMBAR X ACCEL (G)	0.05	25.69	-8.93	95.0	110.0
INT LUMBAR Y ACCEL (G)	-0.21	3.80	-5.55	103.0	95.0
INT LUMBAR Z ACCEL (G)	-0.06	79.47	-30.57	92.0	46.0
INT LUMBAR RESULTANT (G)	0.23	81.23	0.10	92.0	2.0
INT LUMBAR X FORCE (LB)	-0.79	1451.39	-31.07	103.0	197.0
INT LUMBAR Y FORCE (LB)	-7.48	225.38	-19.45	105.0	44.0
INT LUMBAR Z FORCE (LB)	47.94	225.20	-1763.13	186.0	100.0
INT LUMBAR FORCE RES (LB)	48.54	2181.07	19.75	102.0	17.0
INT LUMBAR Mx TORQUE (IN-LB)	3.06	1157.20	-126.42	105.0	283.0
INT LUMBAR My TORQUE (IN-LB)	45.09	375.29	-3832.07	197.0	96.0
INT LUMBAR Mz TORQUE (IN-LB)	-36.94	-12.55	-57.66	66.0	188.0
INT LUMBAR TORQUE RES (IN-LB)	58.41	4003.12	38.98	105.0	429.0
NIJ SHEAR (LB)		72.82	-400.33	225.0	122.0
NIJ TENSION (LB)		88.78		180.0	

NIJ COMPRESSION (LB)		-437.11		100.0	
NIJ FLEXION (IN-LB)		686.50		124.0	
NIJ EXTENSION (IN-LB)		182.04		216.0	
NIJ NTF	0.0000	0.1737	0.0000	119.0	0.0
NIJ NTE	0.0000	0.1464	0.0000	209.0	0.0
NIJ NCF	0.0000	0.3624	0.0000	99.0	0.0
NIJ NCE	0.0230	0.2258	0.0000	65.0	39.0
NIJ NTF AIS >= 2		0.14			
NIJ NTF AIS >= 3		0.05			
NIJ NTF AIS >= 4		0.08			
NIJ NTF AIS >= 5		0.03			
NIJ NTE AIS >= 2		0.13			
NIJ NTE AIS >= 3		0.05			
NIJ NTE AIS >= 4		0.07			
NIJ NTE AIS >= 5		0.03			
NIJ NCF AIS >= 2		0.17			
NIJ NCF AIS >= 3		0.07			
NIJ NCF AIS >= 4		0.09			
NIJ NCF AIS >= 5		0.03			
NIJ NCE AIS >= 2		0.14			
NIJ NCE AIS >= 3		0.06			
NIJ NCE AIS >= 4		0.08			
NIJ NCE AIS >= 5		0.03			
MNIx	0.0061	0.0875	0.0000	119.0	352.0
NMIz	0.0083	0.0451	0.0000	163.0	413.0

201204 Test: 6284 Test Date: 121031 Subj: LARD Wt: 243.0  
 Nom G: 35.0 Cell: Q

Data ID	Immediate Preimpact	Maximum Value	Minimum Value	Time Of Maximum	Time Of Minimum
Reference Mark Time (Ms)				-121.0	
Impact Rise Time (Ms)				24.4	
Impact Duration (Ms)				87.5	
Velocity Change (Ft/Sec)		49.06			
CARRIAGE X ACCEL (G)	0.00	9.90	-7.15	32.0	28.0
CARRIAGE Y ACCEL (G)	0.02	1.29	-1.50	102.0	59.0
CARRIAGE Z ACCEL (G)	0.01	28.56	0.28	28.0	0.0
INTEGRATED ACCEL (FT/SEC)	48.49	49.06	4.35	2.0	390.0
SEAT FIXTURE X ACCEL (G)	0.15	13.02	-4.94	32.0	26.0
SEAT FIXTURE Y ACCEL (G)	-0.01	-0.03	-37.65	237.0	23.0
SEAT FIXTURE Z ACCEL (G)	0.00	39.49	-10.31	36.0	53.0
SEAT FIXTURE DRZ	-0.11	22.08	-7.93	59.0	122.0
SEAT PAN X ACCEL (G)	0.08	42.38	-130.60	81.0	85.0
SEAT PAN Y ACCEL (G)	-0.15	133.05	-132.56	138.0	74.0
SEAT PAN Z ACCEL (G)	0.12	34.69	-6.67	91.0	31.0
SEAT PAN DRZ	0.08	27.03	-12.28	113.0	176.0
TOP LEFT FRONT SEAT X (LB)	-28.75	425.77	-35.98	104.0	9.0
TOP LEFT FRONT SEAT Y (LB)	-35.87	-34.05	-192.54	0.0	100.0
TOP LEFT FRONT SEAT Z (LB)	-27.14	390.05	-486.79	253.0	38.0
TOP LEFT FRONT SEAT RES (LB)	53.45	522.87	52.20	38.0	0.0
TOP RIGHT FRONT SEAT X (LB)	-58.11	550.71	-67.00	104.0	294.0
TOP RIGHT FRONT SEAT Y (LB)	-45.45	-41.34	-253.27	299.0	102.0
TOP RIGHT FRONT SEAT Z (LB)	-35.62	161.93	-892.79	310.0	47.0
TOP RIGHT FRONT SEAT RES (LB)	81.97	935.60	79.93	47.0	4.0
BOT LEFT FRONT SEAT X (LB)	41.42	104.94	35.42	23.0	247.0
BOT LEFT FRONT SEAT Y (LB)	44.68	67.94	25.31	92.0	26.0
BOT LEFT FRONT SEAT Z (LB)	30.41	31.16	-56.08	1.0	32.0
BOT LEFT FRONT SEAT RES (LB)	68.17	123.39	65.43	23.0	476.0
BOT RIGHT FRONT SEAT X (LB)	-43.17	-12.59	-61.62	43.0	98.0
BOT RIGHT FRONT SEAT Y (LB)	23.46	25.42	-27.37	5.0	26.0
BOT RIGHT FRONT SEAT Z (LB)	48.68	50.21	-34.71	4.0	31.0
BOT RIGHT FRONT SEAT RES (LB)	69.22	68.87	13.59	1.0	43.0
BOT LEFT REAR SEAT X (LB)	36.89	745.64	37.12	105.0	0.0
BOT LEFT REAR SEAT Y (LB)	-52.58	217.51	-110.07	110.0	366.0
BOT LEFT REAR SEAT Z (LB)	42.44	59.54	18.61	41.0	393.0
BOT LEFT REAR SEAT RES (LB)	77.03	776.95	73.19	105.0	0.0
BOT RIGHT REAR SEAT X (LB)	-50.22	343.07	-270.55	100.0	141.0

BOT RIGHT REAR SEAT Y (LB)	37.18	41.37	-17.73	1.0	28.0
BOT RIGHT REAR SEAT Z (LB)	51.91	54.87	-210.86	2.0	39.0
BOT RIGHT REAR SEAT RES (LB)	81.29	347.85	33.88	100.0	14.0
LEFT SHOULDER FORCE (LB)	9.39	768.56	2.99	103.0	389.0
RIGHT SHOULDER FORCE (LB)	15.08	802.05	8.68	101.0	30.0
LEFT LAP FORCE (LB)	7.59	462.14	-1.86	110.0	30.0
RIGHT LAP FORCE (LB)	-7.83	-7.08	-9.93	11.0	34.0
INT HEAD X ACCEL (G)	-0.04	7.73	-29.63	287.0	111.0
INT HEAD Y ACCEL (G)	-0.01	20.36	-1.91	125.0	221.0
INT HEAD Z ACCEL (G)	0.09	18.78	-30.67	53.0	111.0
INT HEAD RESULTANT (G)	0.10	43.50	0.09	111.0	4.0
INT HEAD HIC		141.91		101.0	116.0
INT HEAD Ry ANG ACC (RAD/S2)	-1.40	1485.52	-2429.12	74.0	122.0
INT NECK X FORCE (LB)	14.24	71.71	-661.50	248.0	126.0
INT NECK Y FORCE (LB)	-14.73	11.08	-126.76	222.0	116.0
INT NECK Z FORCE (LB)	-10.19	780.14	-252.45	119.0	53.0
INT NECK FORCE RES (LB)	22.89	960.31	18.70	127.0	314.0
INT NECK Mx TORQUE (IN-LB)	24.69	126.73	-253.95	83.0	122.0
INT NECK My TORQUE (IN-LB)	-21.76	261.68	-261.20	119.0	76.0
INT NECK Mz TORQUE (IN-LB)	-14.69	125.27	-77.81	143.0	473.0
INT NECK TORQUE RES (IN-LB)	36.05	327.58	10.95	120.0	397.0
INT CHEST X ACCEL (G)	0.01	1.83	-24.97	479.0	92.0
INT CHEST Y ACCEL (G)	-0.09	10.33	-2.79	100.0	214.0
INT CHEST Z ACCEL (G)	0.08	24.06	-4.56	105.0	124.0
INT CHEST RESULTANT (G)	0.13	35.60	0.09	105.0	3.0
INT CHEST Ry ANG ACC (RAD/S2)	-1.24	681.80	-601.85	51.0	67.0
INT LUMBAR X ACCEL (G)	0.10	10.81	-9.59	42.0	107.0
INT LUMBAR Y ACCEL (G)	-0.04	4.57	-5.71	76.0	57.0
INT LUMBAR Z ACCEL (G)	0.07	38.33	-2.70	92.0	159.0
INT LUMBAR RESULTANT (G)	0.14	38.71	0.09	92.0	390.0
INT LUMBAR X FORCE (LB)	-12.87	669.32	-70.83	105.0	295.0
INT LUMBAR Y FORCE (LB)	-12.11	11.60	-86.48	226.0	122.0
INT LUMBAR Z FORCE (LB)	61.03	477.56	-1578.69	129.0	56.0
INT LUMBAR FORCE RES (LB)	63.54	1584.92	18.06	56.0	26.0
INT LUMBAR Mx TORQUE (IN-LB)	28.87	149.12	-480.06	226.0	121.0
INT LUMBAR My TORQUE (IN-LB)	47.82	402.08	-3412.80	290.0	104.0
INT LUMBAR Mz TORQUE (IN-LB)	-17.28	52.95	-37.29	479.0	100.0
INT LUMBAR TORQUE RES (IN-LB)	58.56	3429.30	26.82	104.0	208.0
NIJ SHEAR (LB)		71.71	-661.50	248.0	126.0
NIJ TENSION (LB)		780.14		119.0	



NIJ COMPRESSION (LB)		-252.45		53.0	
NIJ FLEXION (IN-LB)		606.09		120.0	
NIJ EXTENSION (IN-LB)		245.37		75.0	
NIJ NTF	0.0000	0.5855	0.0000	119.0	0.0
NIJ NTE	0.0000	0.1412	0.0000	104.0	0.0
NIJ NCF	0.0000	0.0311	0.0000	479.0	0.0
NIJ NCE	0.0261	0.2368	0.0000	67.0	93.0
NIJ NTF AIS >= 2		0.21			
NIJ NTF AIS >= 3		0.11			
NIJ NTF AIS >= 4		0.12			
NIJ NTF AIS >= 5		0.04			
NIJ NTE AIS >= 2		0.13			
NIJ NTE AIS >= 3		0.05			
NIJ NTE AIS >= 4		0.07			
NIJ NTE AIS >= 5		0.03			
NIJ NCF AIS >= 2		0.12			
NIJ NCF AIS >= 3		0.04			
NIJ NCF AIS >= 4		0.07			
NIJ NCF AIS >= 5		0.02			
NIJ NCE AIS >= 2		0.15			
NIJ NCE AIS >= 3		0.06			
NIJ NCE AIS >= 4		0.08			
NIJ NCE AIS >= 5		0.03			
MNIx	0.0156	0.1603	0.0001	122.0	63.0
NMIz	0.0093	0.0791	0.0000	143.0	394.0

201204 Test: 6285 Test Date: 121031 Subj: LARD Wt: 243.0  
 Nom G: 35.0 Cell: R

Data ID	Immediate Preimpact	Maximum Value	Minimum Value	Time Of Maximum	Time Of Minimum
Reference Mark Time (Ms)				-121.0	
Impact Rise Time (Ms)				25.2	
Impact Duration (Ms)				86.9	
Velocity Change (Ft/Sec)		49.06			
CARRIAGE X ACCEL (G)	-0.02	10.58	-8.70	32.0	28.0
CARRIAGE Y ACCEL (G)	-0.02	0.88	-1.46	108.0	49.0
CARRIAGE Z ACCEL (G)	0.00	32.20	0.37	23.0	0.0
INTEGRATED ACCEL (FT/SEC)	48.50	49.06	3.17	1.0	385.0
SEAT FIXTURE X ACCEL (G)	-0.10	5.88	-29.76	54.0	36.0
SEAT FIXTURE Y ACCEL (G)	-0.02	10.28	-3.41	32.0	91.0
SEAT FIXTURE Z ACCEL (G)	0.09	32.25	0.23	25.0	0.0
SEAT FIXTURE DRZ	0.10	32.93	-11.67	59.0	122.0
SEAT PAN X ACCEL (G)	0.05	27.63	-204.34	46.0	94.0
SEAT PAN Y ACCEL (G)	0.02	330.17	-0.03	35.0	21.0
SEAT PAN Z ACCEL (G)	0.01	61.91	-8.46	82.0	136.0
SEAT PAN DRZ	-0.03	30.50	-12.39	103.0	166.0
TOP LEFT FRONT SEAT X (LB)	-34.54	354.40	-49.96	101.0	283.0
TOP LEFT FRONT SEAT Y (LB)	-35.86	-32.74	-174.81	18.0	111.0
TOP LEFT FRONT SEAT Z (LB)	-14.00	151.25	-549.85	224.0	36.0
TOP LEFT FRONT SEAT RES (LB)	51.77	604.37	51.42	36.0	1.0
TOP RIGHT FRONT SEAT X (LB)	-55.87	340.88	-58.93	107.0	4.0
TOP RIGHT FRONT SEAT Y (LB)	-43.81	-41.97	-191.48	2.0	113.0
TOP RIGHT FRONT SEAT Z (LB)	8.41	69.57	-658.11	331.0	39.0
TOP RIGHT FRONT SEAT RES (LB)	71.55	692.69	70.38	39.0	0.0
BOT LEFT FRONT SEAT X (LB)	37.31	76.04	15.08	27.0	249.0
BOT LEFT FRONT SEAT Y (LB)	54.76	101.88	42.62	218.0	107.0
BOT LEFT FRONT SEAT Z (LB)	17.32	20.56	-95.30	2.0	31.0
BOT LEFT FRONT SEAT RES (LB)	68.55	143.45	66.18	21.0	2.0
BOT RIGHT FRONT SEAT X (LB)	-39.35	0.66	-147.09	27.0	129.0
BOT RIGHT FRONT SEAT Y (LB)	25.21	29.98	-131.63	1.0	122.0
BOT RIGHT FRONT SEAT Z (LB)	37.16	40.28	-165.47	1.0	117.0
BOT RIGHT FRONT SEAT RES (LB)	59.80	246.40	17.75	123.0	13.0
BOT LEFT REAR SEAT X (LB)	38.04	925.22	34.51	101.0	2.0
BOT LEFT REAR SEAT Y (LB)	-52.54	343.98	-86.32	102.0	458.0
BOT LEFT REAR SEAT Z (LB)	38.54	55.19	31.00	141.0	29.0
BOT LEFT REAR SEAT RES (LB)	75.50	986.04	61.70	101.0	28.0
BOT RIGHT REAR SEAT X (LB)	-40.09	536.09	-339.93	105.0	183.0

BOT RIGHT REAR SEAT Y (LB)	37.34	51.86	-19.70	189.0	102.0
BOT RIGHT REAR SEAT Z (LB)	48.73	88.77	-72.74	74.0	34.0
BOT RIGHT REAR SEAT RES (LB)	73.37	536.53	21.36	105.0	17.0
LEFT SHOULDER FORCE (LB)	14.39	857.13	4.01	110.0	337.0
RIGHT SHOULDER FORCE (LB)	10.49	430.40	9.17	106.0	10.0
LEFT LAP FORCE (LB)	11.88	373.86	7.20	111.0	18.0
RIGHT LAP FORCE (LB)	1.28	250.66	-5.48	110.0	45.0
INT HEAD X ACCEL (G)	0.08	7.71	-30.30	255.0	125.0
INT HEAD Y ACCEL (G)	0.11	4.91	-6.28	72.0	257.0
INT HEAD Z ACCEL (G)	0.04	15.15	-14.63	51.0	120.0
INT HEAD RESULTANT (G)	0.15	32.78	0.11	124.0	4.0
INT HEAD HIC		80.49		119.0	134.0
INT HEAD Ry ANG ACC (RAD/S2)	4.82	1182.83	-1903.48	103.0	129.0
INT NECK X FORCE (LB)	11.67	41.04	-500.75	221.0	132.0
INT NECK Y FORCE (LB)	-9.12	165.37	-26.79	133.0	146.0
INT NECK Z FORCE (LB)	2.28	557.21	-126.51	129.0	50.0
INT NECK FORCE RES (LB)	15.00	750.84	8.16	131.0	468.0
INT NECK Mx TORQUE (IN-LB)	9.45	159.37	-85.46	135.0	34.0
INT NECK My TORQUE (IN-LB)	-19.74	3169.56	-395.18	126.0	133.0
INT NECK Mz TORQUE (IN-LB)	-13.47	109.47	-165.70	264.0	92.0
INT NECK TORQUE RES (IN-LB)	25.71	3173.48	6.71	126.0	339.0
INT CHEST X ACCEL (G)	0.00	2.53	-21.11	36.0	107.0
INT CHEST Y ACCEL (G)	-0.14	6.61	-0.44	114.0	298.0
INT CHEST Z ACCEL (G)	0.05	29.92	-3.16	110.0	28.0
INT CHEST RESULTANT (G)	0.15	36.41	0.10	108.0	7.0
INT CHEST Ry ANG ACC (RAD/S2)	-1.24	583.11	-688.72	49.0	100.0
INT LUMBAR X ACCEL (G)	0.09	10.78	-4.76	37.0	91.0
INT LUMBAR Y ACCEL (G)	-0.10	27.53	-7.78	101.0	29.0
INT LUMBAR Z ACCEL (G)	0.01	48.09	-4.06	103.0	199.0
INT LUMBAR RESULTANT (G)	0.14	54.70	0.09	103.0	7.0
INT LUMBAR X FORCE (LB)	-16.91	793.00	-15.48	112.0	0.0
INT LUMBAR Y FORCE (LB)	-6.13	17.64	-240.28	182.0	115.0
INT LUMBAR Z FORCE (LB)	54.07	411.08	-1157.92	132.0	53.0
INT LUMBAR FORCE RES (LB)	56.99	1179.99	14.54	53.0	24.0
INT LUMBAR Mx TORQUE (IN-LB)	-29.55	118.74	-1215.59	182.0	115.0
INT LUMBAR My TORQUE (IN-LB)	166.62	154.38	-3834.34	0.0	107.0
INT LUMBAR Mz TORQUE (IN-LB)	-27.01	28.21	-35.67	116.0	235.0
INT LUMBAR TORQUE RES (IN-LB)	171.39	4018.11	69.12	114.0	304.0
NIJ SHEAR (LB)		41.04	-500.75	221.0	132.0
NIJ TENSION (LB)		557.21		129.0	

NIJ COMPRESSION (LB)		-126.51		50.0	
NIJ FLEXION (IN-LB)		3488.35		127.0	
NIJ EXTENSION (IN-LB)		130.52		218.0	
NIJ NTF	0.0000	1.2458	0.0000	127.0	0.0
NIJ NTE	0.0189	0.3083	0.0000	133.0	12.0
NIJ NCF	0.0000	0.0894	0.0000	50.0	0.0
NIJ NCE	0.0000	0.0693	0.0000	65.0	0.0
NIJ NTF AIS >= 2		0.36			
NIJ NTF AIS >= 3		0.32			
NIJ NTF AIS >= 4		0.23			
NIJ NTF AIS >= 5		0.09			
NIJ NTE AIS >= 2		0.16			
NIJ NTE AIS >= 3		0.07			
NIJ NTE AIS >= 4		0.09			
NIJ NTE AIS >= 5		0.03			
NIJ NCF AIS >= 2		0.12			
NIJ NCF AIS >= 3		0.05			
NIJ NCF AIS >= 4		0.07			
NIJ NCF AIS >= 5		0.02			
NIJ NCE AIS >= 2		0.12			
NIJ NCE AIS >= 3		0.04			
NIJ NCE AIS >= 4		0.07			
NIJ NCE AIS >= 5		0.02			
MNIx	0.0060	0.1006	0.0000	135.0	108.0
NMIz	0.0085	0.1046	0.0000	92.0	438.0

201204 Test: 6286 Test Date: 130213 Subj: LARD Wt: 242.0  
 Nom G: 24.0 Cell: P

Data ID	Immediate Preimpact	Maximum Value	Minimum Value	Time Of Maximum	Time Of Minimum
Reference Mark Time (Ms)				-113.0	
Impact Rise Time (Ms)				28.0	
Impact Duration (Ms)				94.4	
Velocity Change (Ft/Sec)		40.56			
CARRIAGE X ACCEL (G)	-0.05	6.13	-7.51	30.0	34.0
CARRIAGE Y ACCEL (G)	0.00	0.68	-1.46	90.0	28.0
CARRIAGE Z ACCEL (G)	0.01	23.23	0.36	29.0	0.0
CARRIAGE Z2 ACCEL (G)	0.00	25.99	0.59	28.0	0.0
CARRIAGE Z3 ACCEL (G)	-0.01	14.99	-68.03	12.0	18.0
INTEGRATED ACCEL (FT/SEC)	40.00	40.56	0.00	2.0	293.0
SEAT FIXTURE X ACCEL (G)	0.11	19.74	-3.82	27.0	11.0
SEAT FIXTURE Y ACCEL (G)	0.23	8.52	-1.69	35.0	82.0
SEAT FIXTURE Z ACCEL (G)	0.01	22.64	0.34	25.0	0.0
SEAT FIXTURE DRZ	0.02	24.43	-7.59	64.0	128.0
SEAT PAN X ACCEL (G)	0.05	129.11	-41.30	116.0	68.0
SEAT PAN Y ACCEL (G)	-0.04	10.43	-11.50	96.0	68.0
SEAT PAN Z ACCEL (G)	0.03	32.04	-3.87	44.0	36.0
SEAT PAN DRZ	0.07	18.72	-5.95	121.0	190.0
TOP LEFT FRONT SEAT X (LB)	46.42	71.69	-615.88	337.0	109.0
TOP LEFT FRONT SEAT Y (LB)	64.83	266.52	37.16	117.0	35.0
TOP LEFT FRONT SEAT Z (LB)	-22.80	1060.47	-246.17	44.0	250.0
TOP LEFT FRONT SEAT RES (LB)	83.00	1130.19	79.50	44.0	5.0
TOP RIGHT FRONT SEAT X (LB)	100.49	110.36	-526.33	10.0	106.0
TOP RIGHT FRONT SEAT Y (LB)	59.28	293.99	54.84	113.0	8.0
TOP RIGHT FRONT SEAT Z (LB)	-20.41	1218.33	-112.45	45.0	318.0
TOP RIGHT FRONT SEAT RES (LB)	118.52	1264.72	108.11	45.0	202.0
BOT LEFT FRONT SEAT X (LB)	-53.36	-32.22	-98.59	317.0	35.0
BOT LEFT FRONT SEAT Y (LB)	-83.67	-79.61	-127.51	0.0	384.0
BOT LEFT FRONT SEAT Z (LB)	-14.97	67.36	-16.84	38.0	1.0
BOT LEFT FRONT SEAT RES (LB)	100.44	152.06	95.78	26.0	0.0
BOT RIGHT FRONT SEAT X (LB)	63.41	68.37	23.44	247.0	48.0
BOT RIGHT FRONT SEAT Y (LB)	-21.51	47.51	-20.54	26.0	0.0
BOT RIGHT FRONT SEAT Z (LB)	-60.28	52.24	-57.40	25.0	3.0
BOT RIGHT FRONT SEAT RES (LB)	90.16	86.53	37.38	0.0	47.0
BOT LEFT REAR SEAT X (LB)	-61.93	-63.63	-903.73	0.0	116.0
BOT LEFT REAR SEAT Y (LB)	-111.12	254.80	-151.72	116.0	357.0
BOT LEFT REAR SEAT Z (LB)	21.08	247.12	-533.39	56.0	34.0

BOT LEFT REAR SEAT RES (LB)	129.02	938.97	128.78	116.0	1.0
BOT RIGHT REAR SEAT X (LB)	73.31	466.21	-445.32	163.0	91.0
BOT RIGHT REAR SEAT Y (LB)	-28.42	29.73	-34.26	133.0	72.0
BOT RIGHT REAR SEAT Z (LB)	-53.91	189.57	-143.14	40.0	81.0
BOT RIGHT REAR SEAT RES (LB)	95.43	469.54	27.72	163.0	59.0
LEFT SHOULDER FORCE (LB)	15.88	551.63	13.70	115.0	449.0
RIGHT SHOULDER FORCE (LB)	25.43	458.28	23.61	112.0	17.0
LEFT LAP FORCE (LB)	17.05	175.21	9.41	117.0	19.0
RIGHT LAP FORCE (LB)	27.59	134.80	19.08	116.0	453.0
INT HEAD X ACCEL (G)	0.03	2.78	-18.12	236.0	127.0
INT HEAD Y ACCEL (G)	0.00	3.46	-2.83	37.0	31.0
INT HEAD Z ACCEL (G)	0.09	19.31	-4.37	57.0	29.0
INT HEAD RESULTANT (G)	0.10	19.31	0.08	57.0	11.0
INT HEAD HIC		19.57		118.0	133.0
INT HEAD Ry ANG ACC (RAD/S2)	0.69	1393.35	-870.68	75.0	89.0
INT NECK X FORCE (LB)	22.50	60.65	-185.63	69.0	140.0
INT NECK Y FORCE (LB)	20.22	33.25	-16.90	332.0	114.0
INT NECK Z FORCE (LB)	-28.30	101.19	-149.37	138.0	57.0
INT NECK FORCE RES (LB)	41.43	210.92	21.28	140.0	44.0
INT NECK Mx TORQUE (IN-LB)	31.69	87.91	0.10	127.0	108.0
INT NECK My TORQUE (IN-LB)	-26.72	1127.04	-272.27	26.0	32.0
INT NECK Mz TORQUE (IN-LB)	-28.26	5.91	-130.32	209.0	105.0
INT NECK TORQUE RES (IN-LB)	50.17	1127.83	20.64	26.0	30.0
INT CHEST X ACCEL (G)	0.09	1.35	-12.65	460.0	97.0
INT CHEST Y ACCEL (G)	-0.06	3.26	-0.36	107.0	309.0
INT CHEST Z ACCEL (G)	0.09	19.90	-3.22	63.0	25.0
INT CHEST RESULTANT (G)	0.15	21.05	0.08	111.0	1.0
INT CHEST Ry ANG ACC (RAD/S2)	-0.39	539.81	-566.19	57.0	41.0
INT LUMBAR X ACCEL (G)	0.05	8.85	-5.00	47.0	105.0
INT LUMBAR Y ACCEL (G)	0.11	33.64	-5.89	22.0	62.0
INT LUMBAR Z ACCEL (G)	0.09	28.19	-4.62	106.0	60.0
INT LUMBAR RESULTANT (G)	0.18	33.70	0.05	22.0	350.0
INT LUMBAR X FORCE (LB)	-8.06	-6.09	-427.41	320.0	121.0
INT LUMBAR Y FORCE (LB)	-22.82	-10.75	-120.22	95.0	153.0
INT LUMBAR Z FORCE (LB)	65.20	176.79	-1441.18	186.0	59.0
INT LUMBAR FORCE RES (LB)	69.55	1454.42	33.04	59.0	25.0
INT LUMBAR Mx TORQUE (IN-LB)	47.65	597.36	46.77	159.0	13.0
INT LUMBAR My TORQUE (IN-LB)	-32.52	2524.42	-135.10	120.0	282.0
INT LUMBAR Mz TORQUE (IN-LB)	13.09	55.83	12.31	181.0	19.0
INT LUMBAR TORQUE RES (IN-LB)	59.28	2564.23	50.61	120.0	18.0

NIJ SHEAR (LB)		60.65	-185.63	69.0	140.0
NIJ TENSION (LB)		101.19		138.0	
NIJ COMPRESSION (LB)		-149.37		57.0	
NIJ FLEXION (IN-LB)		1119.10		26.0	
NIJ EXTENSION (IN-LB)		262.48		32.0	
NIJ NTF	0.0000	0.3208	0.0000	26.0	0.0
NIJ NTE	0.0000	0.2048	0.0000	32.0	0.0
NIJ NCF	0.0000	0.2032	0.0000	24.0	0.0
NIJ NCE	0.0437	0.0887	0.0000	465.0	21.0
NIJ NTF AIS >= 2		0.16			
NIJ NTF AIS >= 3		0.07			
NIJ NTF AIS >= 4		0.09			
NIJ NTF AIS >= 5		0.03			
NIJ NTE AIS >= 2		0.14			
NIJ NTE AIS >= 3		0.06			
NIJ NTE AIS >= 4		0.08			
NIJ NTE AIS >= 5		0.03			
NIJ NCF AIS >= 2		0.14			
NIJ NCF AIS >= 3		0.06			
NIJ NCF AIS >= 4		0.08			
NIJ NCF AIS >= 5		0.03			
NIJ NCE AIS >= 2		0.12			
NIJ NCE AIS >= 3		0.05			
NIJ NCE AIS >= 4		0.07			
NIJ NCE AIS >= 5		0.02			
MNIx	0.0200	0.0555	0.0001	127.0	108.0
NMIz	0.0178	0.0823	0.0000	105.0	220.0

201204 Test: 6287 Test Date: 130213 Subj: LARD Wt: 242.0  
 Nom G: 24.0 Cell: O

Data ID	Immediate Preimpact	Maximum Value	Minimum Value	Time Of Maximum	Time Of Minimum
Reference Mark Time (Ms)				-113.0	
Impact Rise Time (Ms)				31.6	
Impact Duration (Ms)				99.0	
Velocity Change (Ft/Sec)		40.56			
CARRIAGE X ACCEL (G)	-0.08	3.65	-3.08	30.0	14.0
CARRIAGE Y ACCEL (G)	-0.03	0.63	-1.46	102.0	26.0
CARRIAGE Z ACCEL (G)	0.00	21.39	0.37	24.0	0.0
CARRIAGE Z2 ACCEL (G)	0.00	26.06	0.56	29.0	0.0
CARRIAGE Z3 ACCEL (G)	-0.02	21.45	-19.88	29.0	487.0
INTEGRATED ACCEL (FT/SEC)	40.01	40.56	0.00	2.0	337.0
SEAT FIXTURE X ACCEL (G)	0.11	19.89	-2.93	39.0	11.0
SEAT FIXTURE Y ACCEL (G)	0.10	5.66	-0.81	35.0	134.0
SEAT FIXTURE Z ACCEL (G)	-0.01	22.41	0.35	24.0	0.0
SEAT FIXTURE DRZ	-0.05	24.37	-7.68	64.0	129.0
SEAT PAN X ACCEL (G)	-0.07	34.06	-58.30	82.0	71.0
SEAT PAN Y ACCEL (G)	0.10	10.49	-8.92	93.0	62.0
SEAT PAN Z ACCEL (G)	-0.08	24.56	-3.03	42.0	69.0
SEAT PAN DRZ	-0.01	18.63	-5.95	124.0	192.0
TOP LEFT FRONT SEAT X (LB)	39.95	57.96	-659.02	387.0	108.0
TOP LEFT FRONT SEAT Y (LB)	38.41	240.71	20.49	114.0	39.0
TOP LEFT FRONT SEAT Z (LB)	17.45	976.17	-354.09	46.0	242.0
TOP LEFT FRONT SEAT RES (LB)	58.19	1032.12	56.44	46.0	3.0
TOP RIGHT FRONT SEAT X (LB)	57.50	64.57	-646.37	10.0	114.0
TOP RIGHT FRONT SEAT Y (LB)	48.54	276.96	42.66	111.0	303.0
TOP RIGHT FRONT SEAT Z (LB)	30.37	1151.78	-171.42	46.0	300.0
TOP RIGHT FRONT SEAT RES (LB)	81.20	1199.43	78.26	46.0	1.0
BOT LEFT FRONT SEAT X (LB)	-38.69	-23.80	-79.11	80.0	31.0
BOT LEFT FRONT SEAT Y (LB)	-44.67	-43.95	-73.04	0.0	286.0
BOT LEFT FRONT SEAT Z (LB)	-36.47	34.86	-36.11	35.0	0.0
BOT LEFT FRONT SEAT RES (LB)	69.51	100.30	69.55	31.0	1.0
BOT RIGHT FRONT SEAT X (LB)	44.72	53.39	5.86	212.0	31.0
BOT RIGHT FRONT SEAT Y (LB)	-40.10	10.27	-40.42	27.0	0.0
BOT RIGHT FRONT SEAT Z (LB)	-56.91	36.75	-58.03	34.0	0.0
BOT RIGHT FRONT SEAT RES (LB)	82.80	83.44	10.98	0.0	30.0
BOT LEFT REAR SEAT X (LB)	-46.14	-48.19	-988.78	0.0	113.0
BOT LEFT REAR SEAT Y (LB)	-50.90	286.44	-118.59	123.0	348.0



BOT LEFT REAR SEAT Z (LB)	-33.91	380.26	-94.91	398.0	44.0
BOT LEFT REAR SEAT RES (LB)	76.67	1035.39	67.96	113.0	31.0
BOT RIGHT REAR SEAT X (LB)	54.29	393.54	-471.86	189.0	98.0
BOT RIGHT REAR SEAT Y (LB)	-41.62	30.99	-41.33	135.0	6.0
BOT RIGHT REAR SEAT Z (LB)	-62.01	235.29	-63.17	38.0	4.0
BOT RIGHT REAR SEAT RES (LB)	92.37	472.14	31.81	98.0	14.0
LEFT SHOULDER FORCE (LB)	2.19	671.01	-0.90	113.0	409.0
RIGHT SHOULDER FORCE (LB)	4.02	622.48	-0.66	108.0	371.0
LEFT LAP FORCE (LB)	14.46	218.73	-1.64	109.0	29.0
RIGHT LAP FORCE (LB)	18.63	165.83	2.10	110.0	30.0
INT HEAD X ACCEL (G)	0.02	12.21	-18.87	292.0	131.0
INT HEAD Y ACCEL (G)	-0.19	5.98	-1.39	129.0	301.0
INT HEAD Z ACCEL (G)	-0.11	19.13	-6.68	70.0	120.0
INT HEAD RESULTANT (G)	0.22	20.45	0.11	128.0	5.0
INT HEAD HIC		26.47		121.0	136.0
INT HEAD Ry ANG ACC (RAD/S2)	-3.47	1489.26	-1124.95	79.0	135.0
INT NECK X FORCE (LB)	12.95	48.12	-367.82	266.0	136.0
INT NECK Y FORCE (LB)	3.86	80.06	-176.91	128.0	138.0
INT NECK Z FORCE (LB)	-1.02	195.90	-243.90	143.0	70.0
INT NECK FORCE RES (LB)	13.59	446.05	6.16	138.0	337.0
INT NECK Mx TORQUE (IN-LB)	17.39	184.31	-135.32	463.0	138.0
INT NECK My TORQUE (IN-LB)	-3166.40	3169.79	-3166.40	43.0	0.0
INT NECK Mz TORQUE (IN-LB)	-7.52	41.85	-107.31	120.0	452.0
INT NECK TORQUE RES (IN-LB)	3166.46	3169.93	11.26	254.0	287.0
INT CHEST X ACCEL (G)	0.07	1.53	-15.82	482.0	98.0
INT CHEST Y ACCEL (G)	0.09	3.95	-0.23	103.0	372.0
INT CHEST Z ACCEL (G)	-0.10	16.15	-2.23	111.0	299.0
INT CHEST RESULTANT (G)	0.17	21.27	0.04	111.0	382.0
INT CHEST Ry ANG ACC (RAD/S2)	2.05	543.86	-604.69	55.0	74.0
INT LUMBAR X ACCEL (G)	-0.09	10.80	-5.73	44.0	116.0
INT LUMBAR Y ACCEL (G)	0.09	7.54	-4.20	132.0	61.0
INT LUMBAR Z ACCEL (G)	-0.07	27.28	-2.05	104.0	210.0
INT LUMBAR RESULTANT (G)	0.17	27.55	0.06	104.0	4.0
INT LUMBAR X FORCE (LB)	30.39	94.66	-350.14	301.0	120.0
INT LUMBAR Y FORCE (LB)	-13.84	16.18	-41.42	93.0	286.0
INT LUMBAR Z FORCE (LB)	52.18	237.68	-1373.24	145.0	59.0
INT LUMBAR FORCE RES (LB)	61.96	1391.54	21.42	59.0	432.0
INT LUMBAR Mx TORQUE (IN-LB)	-0.86	180.91	-68.48	115.0	377.0
INT LUMBAR My TORQUE (IN-LB)	-50.57	2358.57	-340.73	68.0	300.0
INT LUMBAR Mz TORQUE (IN-LB)	0.63	32.92	-4.35	101.0	343.0
INT LUMBAR TORQUE RES (IN-LB)	50.90	2360.40	4.26	68.0	25.0

NIJ SHEAR (LB)		48.12	-367.82	266.0	136.0
NIJ TENSION (LB)		195.90		143.0	
NIJ COMPRESSION (LB)		-243.90		70.0	
NIJ FLEXION (IN-LB)		3158.00		43.0	
NIJ EXTENSION (IN-LB)		3195.56		247.0	
NIJ NTF	0.0000	0.8775	0.0000	254.0	0.0
NIJ NTE	0.0771	2.0411	0.0000	247.0	0.0
NIJ NCF	0.0000	0.9699	0.0000	52.0	0.0
NIJ NCE	1.9282	2.0224	0.0000	32.0	40.0
NIJ NTF AIS >= 2		0.27			
NIJ NTF AIS >= 3		0.18			
NIJ NTF AIS >= 4		0.16			
NIJ NTF AIS >= 5		0.06			
NIJ NTE AIS >= 2		0.60			
NIJ NTE AIS >= 3		0.69			
NIJ NTE AIS >= 4		0.44			
NIJ NTE AIS >= 5		0.20			
NIJ NCF AIS >= 2		0.29			
NIJ NCF AIS >= 3		0.21			
NIJ NCF AIS >= 4		0.18			
NIJ NCF AIS >= 5		0.07			
NIJ NCE AIS >= 2		0.59			
NIJ NCE AIS >= 3		0.68			
NIJ NCE AIS >= 4		0.43			
NIJ NCE AIS >= 5		0.20			
MNIx	0.0110	0.1164	0.0004	463.0	299.0
NMIz	0.0047	0.0677	0.0002	452.0	197.0